WORLD
YNTHETIC

DECEMBER. 1944

DEC 28 19

To our 364 Employees in the Armed Forces . . . and to all of yours

A Cheerful Christmas and Victory in the New Year

Godfrey L. Cabot, Inc.
Boston

Newsletter No. 12
DECEMBER, 1944

Published by Rubber Chemicals Division of DUPONT

MORE NEOPRENE IS AVAILABLE—*NOW*

AN INCREASE in production capacity coupled with a levelling off of demand for neoprene in military products is reflected in the recent removal of many restrictions on its use by the War Production Board. Neoprene can now be used for any item permitted by the current Rubber Order (R-1), and for many other products whose manufacture will not divert manpower from military needs.

MONTHLY CONSUMPTION of neoprene is well over 9,000,000 lbs. Production capacity at Louisville is

sufficient to take care of current demands and any unexpected uses for war products and in addition many civilian products now prohibited because of the shortage of manpower and processing equipment. Moreover, plant expansion is well under way so that by early 1945, production capacity at Louisville and Deepwater, N. J. will be 14,000,000 lbs. per month—about 10 times that manufactured in 1941. Only a totally unexpected emergency —one which would affect all elastomers—can create a shortage. It is now safe to say: "There's plenty of neoprene" and rubber manufacturers can plan their present and future production programs on the basis of an assured supply.

EARLY RESTRICTIONS placed on the use of neoprene were a military necessity. It had to be conserved for the most important uses. The properties which made neoprene an important and vital material for war products, can now be utilized for the creation of quality rubber products for all uses. Now rubber manufacturers and consumers are free to give every consideration to the widespread use of neoprene. It is expected that they will, since many new performance requirements will be demanded for the products of the future.

ABOUT NEOPRENE, ITSELF—

It is the most versatile synthetic rubber. When a product calls for a high quality resilient material, a lot of time and effort can be saved by using neoprene *first.* It is the standard against which to compare *all* resilient materials, because it's an all-purpose rubber. For many applications, it is the best material though not always the cheapest. *It pays to try neoprene first.*

Through the mill

NEOPRENE TYPES GN and GN-A are no longer being supplied from the Carney's Point Plant, but their counterparts, GRM and GRM-10, are available for prompt shipment from the Rubber Reserve Plant at Louisville, Ky.

NEOPRENE TYPES E, M, CG, FR, KNR, and Neoprene Latices Types 571, 572 and 60 are supplied from the DuPont Plant at Carney's Point, N. J.

BACK THE ATTACK WITH WAR BONDS

DUPONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

INDIA RUBBER WORLD, December, 1944, Vol. 111, No. 3. Published monthly by BILL BROTHERS PUBLISHING CORP., 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at New York, N. Y., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents. Application pending transfer of the second-class mailing privilege to the New York, N. Y., Post Office.

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DETROIT

K&M LIGHT MAGNESIUM OXIDE

Always the same light weight . . . always gives the same quality and performance. That's why Neoprene Compounders repeatedly insist on K&M Light Magnesium Oxide.

To answer these repeat demands, Keasbey & Mattison have expanded their facilities for producing Light Magnesium Oxide. Now, more of this essential compounding material is available . . . at the same high, uniform quality.

KEASBEY & MATTISON
COMPANY, AMBLER, PENNSYLVANIA
One of America's oldest and most reliable makers of asbestos and magnesia products. Founded 1873

ARMY E NAVY
K&M
best in asbestos

OUR DISTRIBUTOR FOR K&M LIGHT MAGNESIUM OXIDE IS:

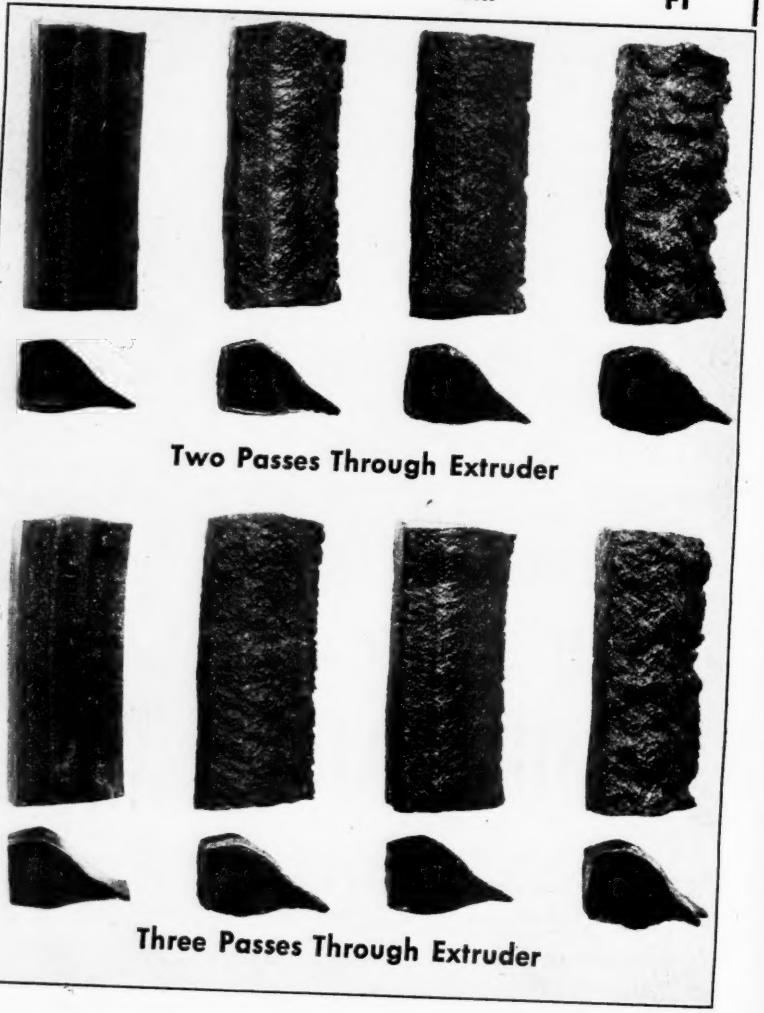
AMERICAN CYANAMID & CHEMICAL CORPORATION
30 Rockefeller Plaza, New York 20, N. Y.

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:

AKRON, OHIO, Akron Chemical Company
BOSTON, MASS. Ernest Jacoby & Company
CHICAGO, ILLINOIS, Herron & Meyer
LOS ANGELES, CAL., H. M. Royal, Inc.
TRENTON, N. J., H. M. Royal, Inc.

PHILBLACK A

Saves Processing Time Improves Finished Product



The shorter time required for processing GR-S with PHILBLACK A, as compared with three other types of black, is clearly shown in the above illustration taken from the PHILBLACK A booklet. The PHILBLACK A stock after two passes through the extruder has become extremely smooth, while the other stocks will require additional breakdown to obtain the same degree of smoothness. Many other comparisons and interesting facts are shown in the PHILBLACK A booklet.

WRITE FOR YOUR FREE COPY TODAY

PHILLIPS PETROLEUM COMPANY

Philblack Division, First Central Tower, Akron, Ohio

A SUGGESTION FOR AIR-CURED STOCKS -PARTICULARLY FOOTWEAR

MBTS-METHAZATE

This Naugatuck Combination offers the following:

1. Economical Acceleration
2. Processing Safety — variation of the amounts of both accelerators permits adaption to any plant requirements
3. Combines Retardation with activation at curing temperatures
4. For 260° F cures we recommend

MTBS -0.5
METHAZATE -0.4
Based On 100 R.H.C.

PROCESS • ACCELERATE • PROTECT
WITH
NAUGATUCK CHEMICALS

Naugatuck Chemical
DIVISION OF UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER NEW YORK 20, N. Y.
IN CANADA: *Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.*

HARDESTY CHEMICAL COMPANY

PLASTICIZERS

answer your plasticizing problem

These HARDESTY Chemical Company plasticizers are finding new uses every day. They are helping to achieve peak plastic production throughout the field. Investigate now!

• • •

SEBACIC ACID

Specific gravity	1.085 25/15°C
Melting point	128°C
Neutralization equivalent	102
Free fatty acid	98.5%
Moisture	0.15%
Mol. weight	202.14

BUTYL ROLEATE

Free fatty acid	2%
Butanol	0.2%
Moisture	0.2%
Color	Red

DIBUTYL SEBACATE

Purity	98.5% Minimum
Specific gravity	0.935 20/20°C
Acidity as Sebacic	0.3% Maximum
Color	15Y, 3.5R
Butanol	0.1% Maximum
Flash point	380°F
Boiling point	344°C. at 760 mm. 175-180°C at 3 mm.
Water solubility	Less than 1% at 25°C
Freezing point	11°F
Weight per gallon	7.8 lbs.
Index of refraction	1.4391 at 25°C
Dielectric constant	3.6
Power factor—60 cycles	6

CAPRYL ALCOHOL

Specific gravity	0.815/20°C
Mol. weight	130.23
Flash point	172°F
Distillation range	176.8/179.9°C
Refractive index	1.4266 at 20°C
Lbs. per U.S. gallon	6.81
Boiling point	178/179°C
Moisture	0.25%

• • •

Send for samples and additional information

HARCHEM

PLASTICIZERS

Alkyl Roleates

Dibutyl Sebacate

Sebacic Acid

Capryl Alcohol

[*Amecco Chemicals, Inc. — sole distributors of Sebacic Acid*]

HARDESTY CHEMICAL COMPANY, INC., 41 EAST FORTY-SECOND STREET, NEW YORK 17, N.Y.

Answer: Because you get a LOT more!*

*question: why should you pay even a *little* more for Hycar?

COMPARING the price per pound of Hycar and other synthetic rubbers is like comparing the price per pound of hot-house strawberries with rutabagas. Comparative prices mean little if the materials aren't the same. And there is no other group of synthetic rubbers exactly like Hycar.

Hycar's superiority naturally commands a premium price. Yet after considering the compounding and processing economies inherent in Hycar, *this premium material gives you more for your money than less desirable synthetic rubbers.* And better finished products that in turn command premium prices are the result.

You get a lot more when you pay a *little* more for Hycar!

Take a look at some of the advantages of Hycar as compared to other oil-resistant types:

- . . . *Better storage stability in crude and compounded states—won't set up—no stickiness*
- . . . *Dependable uniformity of crude material which eliminates processing changes and compound revisions*
- . . . *Lower specific gravity means 25% more volume in finished product*
- . . . *Better oil and gas resistance*
- . . . *Can be blended with GR-S and maintain adequate oil resisting characteristics*
- . . . *Will take higher pigment loadings without undue sacrifice of quality*
- . . . *Better extrusion characteristics—maintains shape during processing—won't collapse*
- . . . *A variety of combinations of properties not otherwise obtainable*
- . . . *Excellent performance in severest types of service has been proved throughout all industry*

Hycar's Technical Service Staff is at your service, ready to help you with your individual problems. *Hycar Chemical Company, Akron 8, Ohio.*

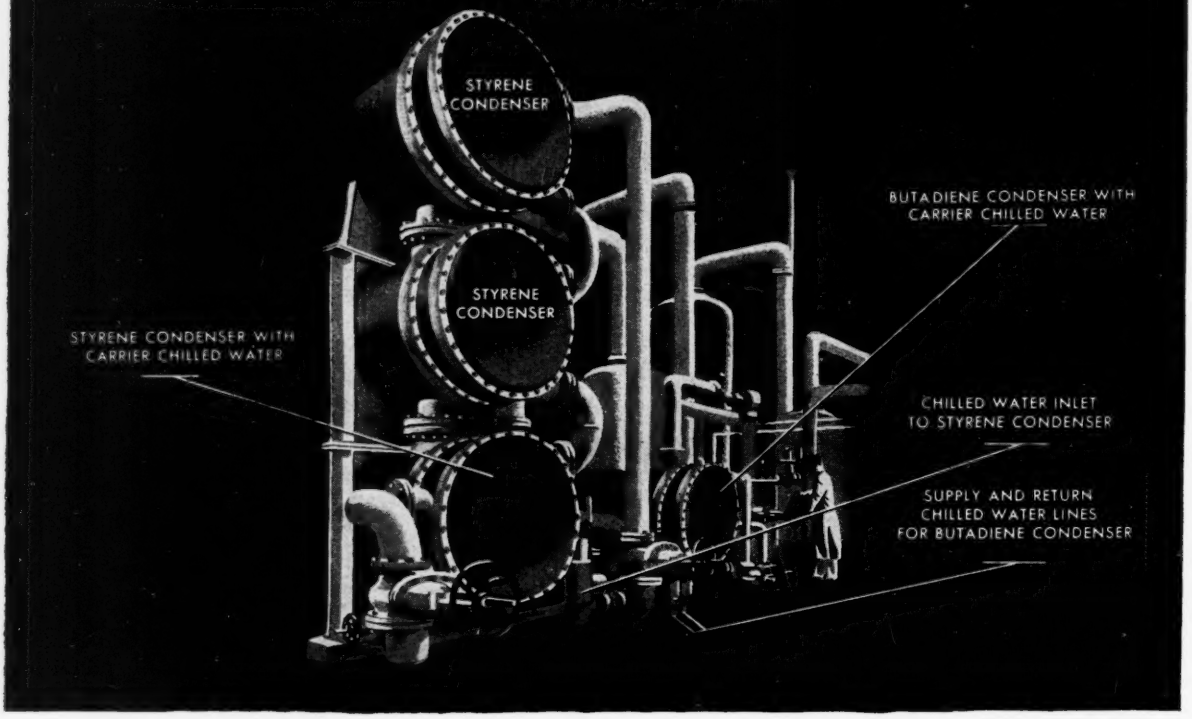
Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

PROBLEM: How to increase plant efficiency through recovery of Reagents


STYRENE CONDENSER
STYRENE CONDENSER
STYRENE CONDENSER WITH CARRIER CHILLED WATER
BUTADIENE CONDENSER WITH CARRIER CHILLED WATER
CHILLED WATER INLET TO STYRENE CONDENSER
SUPPLY AND RETURN CHILLED WATER LINES FOR BUTADIENE CONDENSER

SOLUTION: Condensation of gaseous materials by refrigeration

IN THE Firestone Tire & Rubber Company plant at Lake Charles, Louisiana, the reactors for Buna manufacture are vented through condensers. The Butadiene and Styrene which fail to combine during the reaction period are drawn off through these condensers and are largely recovered through condensation by cooling. For the most effective operation, the condensers must be kept cold.

Two Carrier Centrifugal Refrigeration machines, each of 560-ton cooling capacity, are supplying cooling water to the low temperature condensers. The dependable Carrier refrigeration holds the recovery condensers within the prescribed 55°-58°F. range, no matter how long the run. Result: the Lake Charles plant has an operating record of 98% reaction efficiency.

Whenever there is a tough job of refrigeration . . . or humidity control, air conditioning or industrial heating, Carrier is the natural first thought.

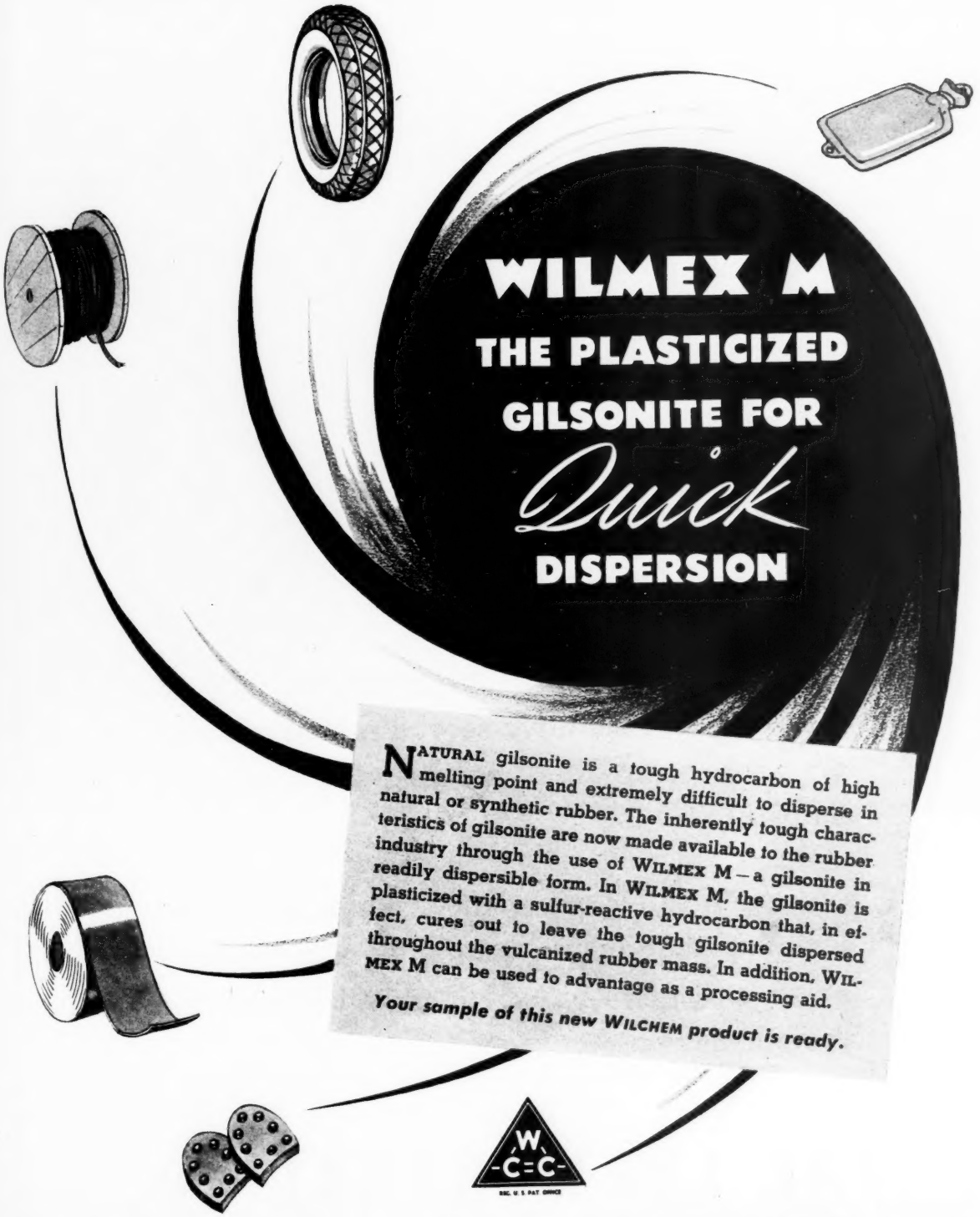
Carrier can bring to your particular requirements the technical knowledge and engineering experience of 22 years of highly successful service to the rubber industry.

Consult Carrier Corporation on any problem — industrial or commercial — that you have in refrigeration, and in moisture and heat control of air.

Carrier

AIR CONDITIONING • REFRIGERATION

CARRIER CORPORATION, Syracuse 1, N. Y.



NATURAL gilsonite is a tough hydrocarbon of high melting point and extremely difficult to disperse in natural or synthetic rubber. The inherently tough characteristics of gilsonite are now made available to the rubber industry through the use of WILMEX M—a gilsonite in readily dispersible form. In WILMEX M, the gilsonite is plasticized with a sulfur-reactive hydrocarbon that, in effect, cures out to leave the tough gilsonite dispersed throughout the vulcanized rubber mass. In addition, WILMEX M can be used to advantage as a processing aid.

Your sample of this new WILCHEM product is ready.

WILMINGTON

CHEMICAL CORPORATION

10 EAST 40TH STREET • NEW YORK 16, N. Y.

LOEWENTHAL

LINKED TOGETHER SINCE 1868

RUBBER

Rubber has been our business since its inception and we have served rubber reclaimers with scrap from the beginning of their industry.

The result is experience, "know how" and facilities that insure proper service today—scrap properly sorted to specification and prompt deliveries.

THE LOEWENTHAL CO.

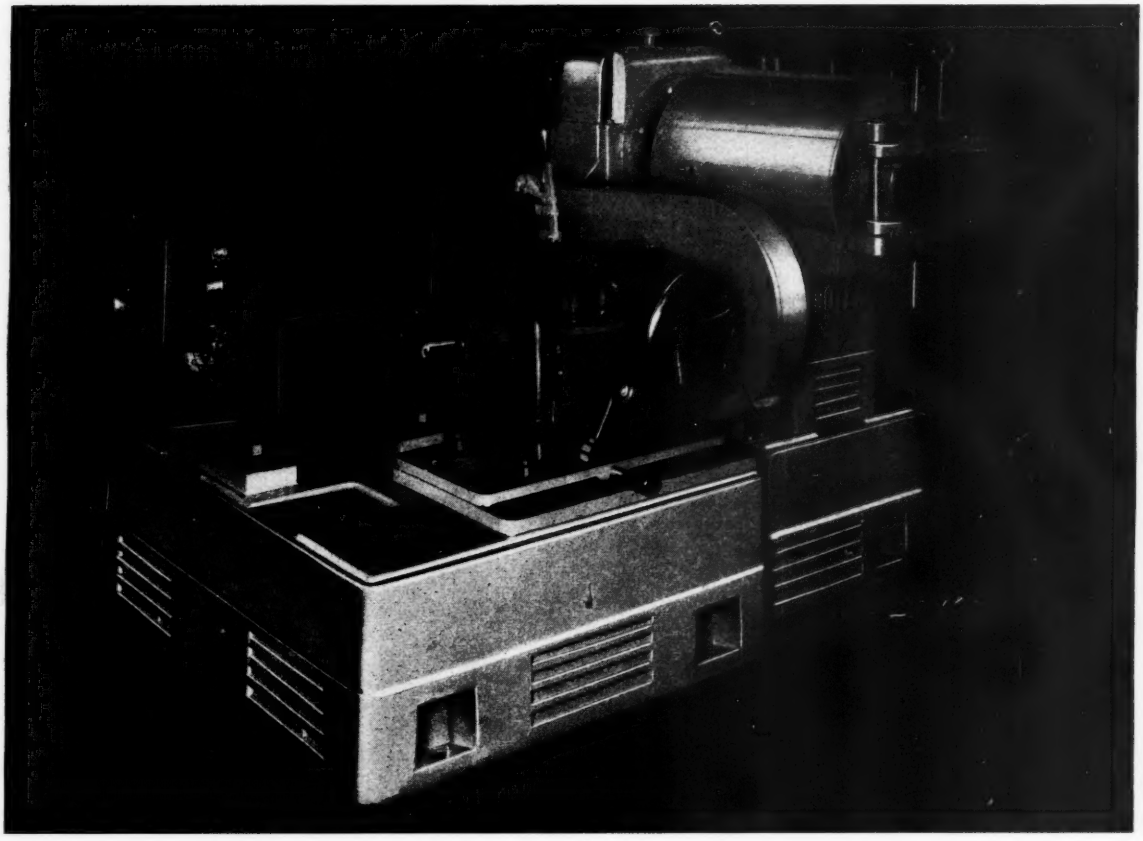
JACK SIDER, *President* J. K. McELLIGOTT, *Exec. Vice-Pres.*

We Solicit Your Inquiries

188 W. RANDOLPH STREET
CHICAGO 1, ILL.

Cable Address: "Gyblowell"

159 CLEWELL STREET
AKRON 5, OHIO



65 Years of Progressive Pioneering

Beginning with the invention of the screw-type machine in 1880 John Royle & Sons have constantly pioneered in the development of continuous extrusion equipment.

Essentially the continuous extrusion process hasn't changed a great deal. There have been refinements—the most apparent being in the field of temperature control and in the development of accessory equipment.

Sixty-five years of progressive pioneering have produced a wealth of knowledge and experience. This "know how" is built into Royle equipment—reflected in performance records.

JOHN ROYLE & SONS

ROYLE PATERSON N. J.

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE 1880

Continental Europe
James Day (Machinery) Ltd.
London, England

Home Office
B. H. Davis J. W. VanRiper
SHerwood 2-8262

Akron, Ohio
J. C. Clinefelter
UNiversity 3726

PATERSON 3, NEW JERSEY

A combination that's become a *Lasting Friendship*

LASTING is exactly the word for it. For the combination of wire and rubber has brought about greater *lasting* qualities for tires, V-belts, flat conveyor belts, hose, and scores of other rubber products.

Yes, wire reinforcement of rubber eliminates stretching, increases tensile strength, elasticity, and rigidity—makes rubber better able to do the important jobs in store for it.

That's why we at National-Standard are devoting so large a part of our time and resources to developing better wire and methods of application for every conceivable wire-and-rubber combination—wire that meets not only the specifications of today, but presents to both the rubber industry and ourselves, *new* product possibilities for *tomorrow*.

So, if you have a problem along that line, perhaps our experience and research facilities can be of help . . . and it *may* lead to a *lasting* friendship.

BUY WAR BONDS AND STAMPS

NS
NATIONAL STANDARD Company

Divisions of National-Standard Company

NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

ATHENIA STEEL
Clifton, N. J.
COLD ROLLED, HIGH-CARBON SPRING STEEL

WAGNER LITHO MACHINERY
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

THE JAPS STARTED IT...

BUT WE'LL FINISH THE JOB!

When Japan shut off an extremely large portion of our supply of natural crude rubber, America was able to achieve complete independence from foreign rubber imports through the development of our own synthetic rubber supply. Although the production of synthetic rubber is a solved problem, one perplexing problem remains, hence this prize offer:

$1000.00 IN CASH PRIZES

"FOR THE BEST PAPER ON THE UTILIZATION OF CURED SYNTHETIC SCRAP RUBBER"

A group of rubber technologists identified with the rubber industry, known as the Chicago Rubber Group, is offering three prizes, totaling $1000.00 for the best papers on the utilization (reclaiming and processing) of cured synthetic rubber scrap. While the papers may deal with any phase of the problem, here are some subjects which suggest themselves: 1. Separation and segregation of synthetic scrap rubber. 2. Methods of identification of synthetic scrap rubber. 3. Reclaiming of synthetic scrap rubber. 4. Compounding studies which will result in greater use of reclaimed synthetic scrap, or of ground synthetic scrap rubber.

First prize $500.00; second prize $300.00; third prize $200.00. If you feel that you have ideas of value for this contest, be sure to enter! You may win one of these substantial cash prizes.

READ THESE SIMPLE CONTEST RULES

This contest is open to anyone in the United States or Canada excepting officers and directors of the Chicago Rubber Group for 1943-45. Selection of subject matter is left to the discretion of the contestant. Papers should be based upon information which has not previously been presented before any technical society meeting or published in any trade magazine. Contest closes at midnight on August 1, 1945. Awards will be made during the fall meeting of the American Chemical Society in Chicago, 1945. The decision of the judges will be final. Each author must submit three copies of his paper to Mr. A. R. Floreen, Vice President, City National Bank & Trust Co., 208 S. La Salle Street, Chicago. These three copies will be judged separately by the Rubber Manufacturers Association, the Rubber Reclaimers Association and the Rubber Division of the American Chemical Society. The judges will report their findings to Bruce W. Hubbard, Chairman, Chicago Rubber Group, 2512 W. 24th Street, Chicago, to whom all inquiries for additional information should be addressed.

Sponsored by CHICAGO RUBBER GROUP, CHICAGO

SPACE DONATED BY WITCO CHEMICAL COMPANY

The difference in Continex SRF is that it is "engineered" to provide improved processing results. Rigidly controlled in production, this perfected semi-reinforcing furnace type black delivers greater strength and loading capacity... higher rebound resilience and longer service life. SEND FOR YOUR COPY of the Continex SRF Technical Bulletin. Prepared by Witco Research Laboratories, it gives a detailed report on the properties and characteristics of Continex SRF.

CONTINENTAL CARBON COMPANY

MANUFACTURER

[CONTINENTAL CHANNEL AND FURNACE BLACKS]

WITCO CHEMICAL COMPANY

DISTRIBUTOR

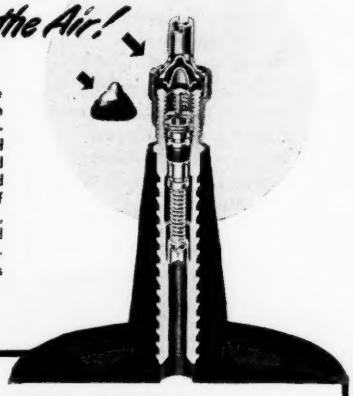
[FORMERLY WISHNICK-TUMPEER, INC.]

MANUFACTURERS AND EXPORTERS

OR- THIS?

This Seals the Air!

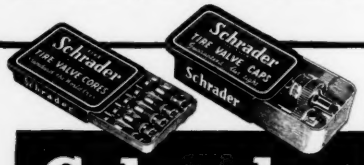
All Standard Schrader Valve Caps in use today contain the specially designed sealing unit with a dome-shaped rubber washer vulcanized between two dome-shaped BRASS plates. Because of their unique construction, these caps are guaranteed airtight up to 250 lbs. pressure. This mighty midget does the work.



MR. & MRS. AMERICA

How to help save your tires. Make it a habit to:

1. Check the tightness of your valve cap each time after you inflate your tires to effect a 100% seal.
2. While you have the cap off (to gauge or add air) look inside it to see if the washer is worn out.
3. If you have no cap or the washer is worn out, replace it as soon as possible with a Standard Cap to be sure that underinflation cannot be caused by leakage through the valve.



Schrader
CONTROLS THE AIR

Would you use an elephant if your tires wore out? Of course not—but one might be handy if you couldn't get the new tires you need. With 150,000 cars going off the road every month, many because of worn out tires, you had better "baby" your present tires, if you want to continue driving.

The most important single factor in preserving tires is proper inflation, for lack of even a few pounds causes excessive wear, damage to side walls and less mileage. How to prevent ruinous underinflation? It's easy. (1) Check air pressures regularly with an accurate gauge. (2) Inflate when needed. (3) Seal the air in at the valve mouth with an airtight Standard Schrader Valve Cap.

Our Armed Forces know the importance of Standard Caps. No pneumatic-tired vehicle passes inspection unless a Standard Cap is screwed down tight on the tire valve mouth. And since their need is greater than ours, your dealer may be temporarily out of caps. Try again later—and be sure a Schrader Cap is on every tire, including your spare, as soon as possible.

ORIGINATORS OF THE COMPARATIVE AIR LOSS SYSTEM

CAPS are vital for TIRE CONSERVATION

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* BROOKLYN, NEW YORK

11 YEARS OLD AND STILL GOING STRONG!

SOME INSTRUMENT "EXPERTS" said it couldn't be done when Taylor installed the controls for Radio City's huge air conditioning system back in 1933. Yet today, eleven years later, the system is still so outstandingly successful that NBC is running this ad in the trade journals telling how good it is!

YOU may not care a hoot about *air conditioning.* But if you're concerned about *instrumentation,* this NBC setup should set your mind at rest on three important points: the *dependability, versatility,* and *low cost* of Taylor Fulscope air-operated controllers and Taylor temperature-sensitive tube systems. Here are a few highlights:

1. Performance exceeded expectations from the very start. The 64 Taylor Fulscope Controllers in the central control room below provide *individual* temperature control for NBC studios and offices and Radio City retail stores—and temperature has consistently been maintained within *plus or minus* ½° *F.* For eleven years these Fulscopes have controlled and recorded the temperature of 23,000,000 cubic feet of air per hour, providing a complete change of air *every 8 minutes.*

2. More than six miles of connecting tubing were required between the temperature-sensitive bulbs and instruments, with some of the tube systems as long as 425 feet. An interesting example of NBC's faith in this kind of system and our ability to engineer it, is that they *cemented the connecting tubing permanently in the walls.*

3. The Taylor Fulscope is one of the most versatile, flexible instruments ever developed. It would have to be to do such a complex job. Today's Fulscopes, thanks to continued improvement, are even more versatile. Yet they are essentially rugged and long-lived because their action is inherently simple. *Maintenance is next to nothing.* And *first cost is low* for such an accurate, high quality instrument.

TIDE, AUGUST 1, 1944

35

the Weather eats out of his hand

▶ Mark Twain to the contrary, somebody *does* do something about the weather—makes it, in fact, just as he wants it—is able to forecast it months in advance.

His is the job of keeping 4,200,000 cubic feet at NBC temperature ideal, dew point just what it should be, humidity never varying.

Humidity, that's the important thing in manufacturing made-to-order weather and processing it for string and percussion instruments, singers' throats and a host of performers who need the best atmospheric conditions for the best performances.

That's why NBC operates one of the most completely integrated air-conditioning systems in the world . . . 64 separate mechanical lungs so delicately coordinated that hundreds of people may enter one studio without raising or lowering the temperature in the one next door.

This elaborate air-conditioning system helps keep actors and audiences comfortable and responsive, of course, but all that is secondary to the role it plays in contributing to better broadcasting . . . building a smoothness of presentation, a fidelity of instruments and vocal cords which contributes so much to the perfection of NBC's musical presentations.

* *

Custom-built weather is just one of the many examples of the manner in which NBC strives for perfection in the little things of radio, knowing that the grand total of little things well done helps NBC maintain its leadership, helps make NBC *"The Network Most People Listen to Most."*

They all tune to the

National Broadcasting Company

It's a National Habit

America's No. 1 Network

NBC

A Service of Radio Corporation of America

BUY MORE WAR BONDS AND KEEP 'EM!

ARMY ★ NAVY

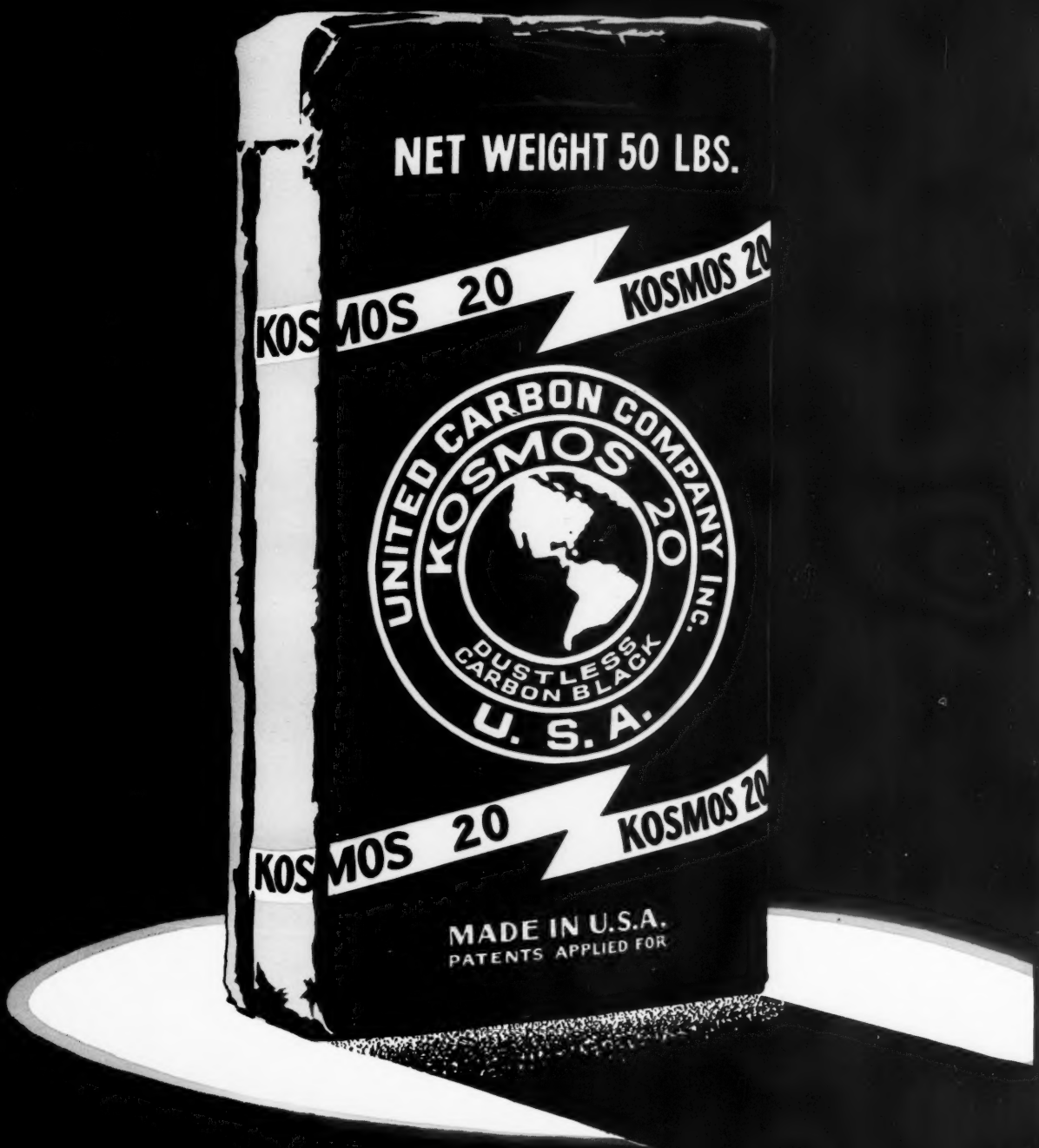
If you need instrumentation for any process, we believe it will pay you to call Taylor first. Chances are 99 to 1 we can help you because Taylor Fulscope Controllers are equally adaptable to temperature, pressure, rate of flow, or liquid level. And they're available in five completely interchangeable forms of control to meet practically any processing requirements or operating conditions. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Taylor Instruments

MEAN

ACCURACY FIRST

IN HOME AND INDUSTRY


NET WEIGHT 50 LBS.
KOSMOS 20
KOSMOS 20
UNITED CARBON COMPANY INC.
KOSMOS 20
DUSTLESS CARBON BLACK
U. S. A.
KOSMOS 20
KOSMOS 20
MADE IN U.S.A.
PATENTS APPLIED FOR

KOSMOS 20

KOSMOS 20 is a semi-reinforcing (SRF) type carbon black made by United's special furnace process.

IDEAL for the GR-S and other rubbers used in military and civilian goods.

OUTSTANDING for ease of processing, good plasticity, fast rate of cure, high resiliency, and low heat build-up.

WELL-KNOWN for uniform quality and performance.

RECOMMENDED for blending with channel black for moderate reinforcement and low heat build up.

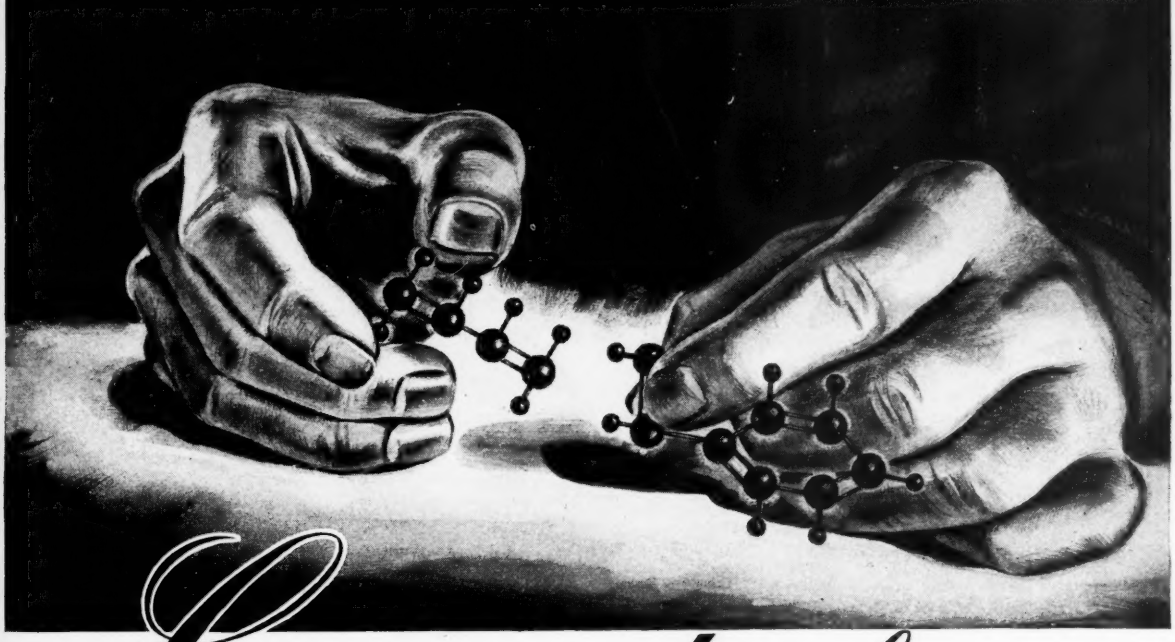
KOSMOS 20 is a Strong Rubber Favorite.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

SYNTHETIC RUBBER & RESIN COMPOUNDS



Custombuilt

FOR YOUR PRODUCT OR PROCESS

A few Applications of GENERAL LATEX Product Development

Aircraft Cements
Carpet Backing
Can Sealing
Cable and Wire
Combining Compounds
General Adhesives
Hose and Belting
Impregnating Compounds
Pile Fabrics
Protective Clothing
Shoe Adhesives
Sizings

A practical approach to the use of synthetic dispersions in your product is to refer your problem to our laboratory. No matter what the process—coating, impregnating, or bonding—our experienced technical staff can compound the material best suited to your requirements. In the case of an entirely new product, we will work out all the details of manufacturing procedure—from pilot operations to commercial production in your plant. Why not talk it over with one of our technical representatives?

GRS latex types 2 and 3, normal and concentrated, available from stock.

A Complete Service to Manufacturers

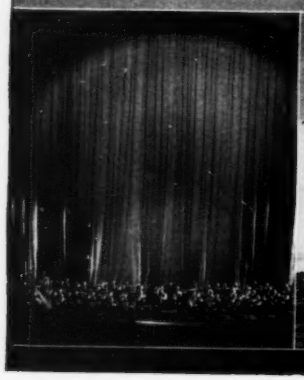
RESEARCH • MATERIALS • ENGINEERING • MANUFACTURE

General Latex & CHEMICAL CORP.

666 MAIN STREET, CAMBRIDGE, MASS.

Agents for Rubber Reserve Company for storage and distribution of natural rubber latex. Distributors for Rubber Reserve Company for synthetic latex. Operators of the Government-owned Paytown, Texas, synthetic rubber plant in collaboration with the General Tire & Rubber Co.

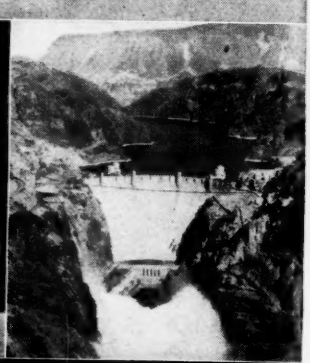
Would you believe it?



BALDWIN supplied the hydraulic elevators that raise and lower the stage of Radio City Music Hall.

BALDWIN diesel engines are used for main propulsion units on minesweepers and for auxiliary power on many other vessels.

BALDWIN testing machine of 3,000,000 pounds capacity can be controlled so as to break the shell of a hatching egg without harming the chick.



BALDWIN hydraulic turbines, 115,000 horsepower capacity, driving huge electric power generators, are installed at Boulder Dam.

Baldwin manufactures a wide diversity of products, including testing equipment for wind tunnels, steering gears for LST landing craft, hydraulic elevators for aircraft carriers, and many other machines and instruments, serving industry on which America is depending to speed final victory.

Of course, Baldwin is well known as the builder of locomotives of all types—steam, diesel-electric and electric—doing their share of the greatest transportation job in history.

BALDWIN

BLW THE BALDWIN GROUP

The Baldwin Locomotive Works, Philadelphia, Pennsylvania: Locomotive & Ordnance Division; Baldwin Southwark Division; Cramp Brass and Iron Foundries Division; Standard Steel Works Division; The Whitcomb Locomotive Co.; The Pelton Water Wheel Co.; The Midvale Co.

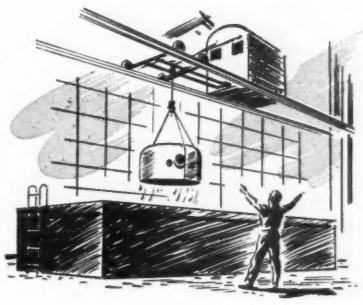
"...It took CHEMISTRY to realize the nation's wealth

American manufacturers once relied on *imported* camphor, an essential ingredient in many important products of industry. When war cut off these imports, however, the *domestic synthesis* of camphor was greatly enhanced by a substance which Hercules' chemists produced from wood turpentine . . . *Alpha-pinene.* This is just one example among hundreds of how Hercules research has helped bring to light the hidden wealth of our natural resources."

DAVID DIETZ, *Science Editor of Scripps-Howard Newspapers, Author, Pulitzer Prize Winner*

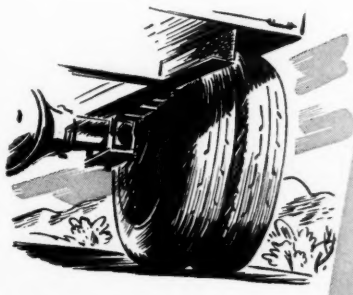
PROTECTING HEALTH from food contamination by flies and other insect germ-carriers is one of the jobs whose importance can hardly be exaggerated . . . a job now handled by a terpene chemical product. Thanite*, the modern toxic agent used in sprays, is in great demand.

WASHING WOOL—saving time. Yarmor* Pine Oil saves up to 30% of the time required for scouring and processing of wool. Yarmor is a wetting agent, lowering surface tension, emulsifying dirt and grease, producing fluffier, cleaner wool, helps get the most out of our wartime supply.



GREASE-GETTER. Another wetting agent is Dresinate*. Dresinate is speeding the production drive by making it easier for alkaline baths to replace solvent baths for *cleaning metals.* Effective in both strong and weak alkaline baths, it has no harmful chemical action on soft metals.

BEST SOLVENT. For many uses besides paints, there is conceded to be no better solvent than turpentine. Hercules produces the finest clear, pure, water-white turpentine which thins and spreads paint without weakening its color, helps dry it fast.

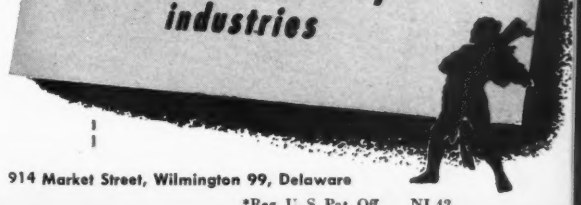


LESS RUTS. Just a small amount of Hercules' amazing new product, Stabinol*, when properly mixed with the top few inches of soil, and then compacted, makes a completely water-proof surface—*preventing mud.*

HERCULES

TERPENE AND ROSIN CHEMICALS

offer answers to material problems in many industries



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INCORPORATED

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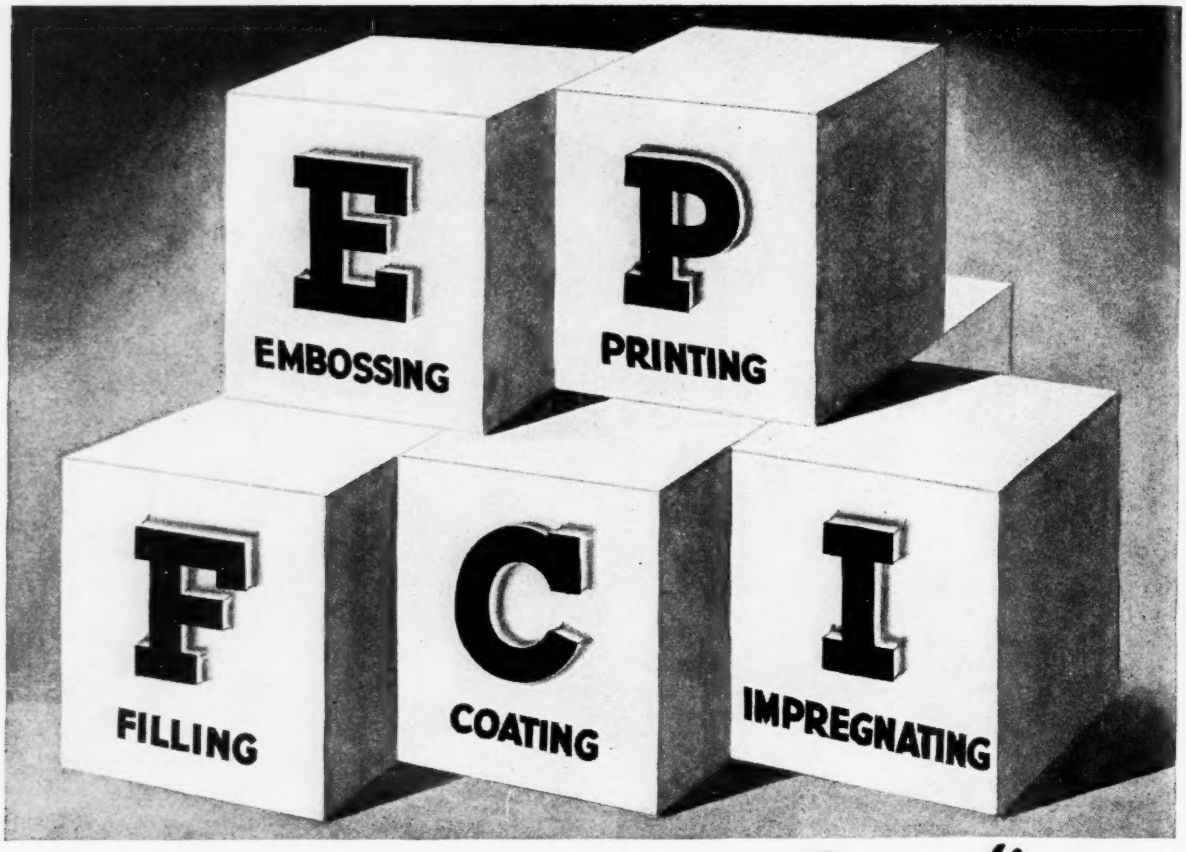
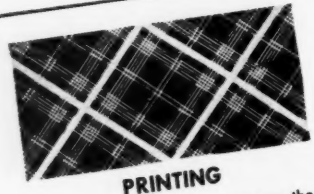


To the basic F-C-I we now add *Printing* to broaden the use field of special finished cloth . . .

Printing means adding to the finished cloth surface a color, design or pattern purely decorative or in which may be combined a trade mark, firm name, pictorial sketch, etc.

Cloth may be surfaced for any printing or lithographing process but as we use the term "printing" we mean running from cloth rolls on a production basis. Some very novel and beautiful printed effects have been produced on cloth for bookbinding. Multiple colors may be used and reasonably accurate register of colors maintained.

As cloth finds new fields of industrial use the possibilities of printing become greater. *Printing* may be definitely regarded as one of the major steps in preparing cloth for specialized uses.



PRINTING

as a cloth finishing process involves the running of the cloth from roll to re-roll at production speeds. Penetrating colors are generally used and the cloth texture is not affected. Printing is one of the steps in specialized cloth processing offering many applications and variations to fit special needs.

CURRENT HOLLISTON PRODUCTION includes COATED AND IMPREGNATED FABRICS . . INSULATING CLOTH BASE SEPARATOR CLOTHS rubber, starch-filled, glazed. TRACING AND BLUE PRINT CLOTHS white and blue, ink or pencil. MAP CLOTH, PHOTO CLOTH, self-adhesive. REINFORCING FABRICS. SIGN, LABEL AND TAG CLOTHS, waterproof to take any ink, meet any inking problem. BOOK-BINDING CLOTHS. SHADE CLOTH, impregnated waterproof, opaque, translucent or light proof.

We urge you to consider CLOTH; and invite you to consult with us concerning possibilities and developments for your specific requirements.

The Holliston Mills, Inc.

PROCESSORS OF CLOTHS FOR SPECIAL PURPOSES

NORWOOD, MASSACHUSETTS

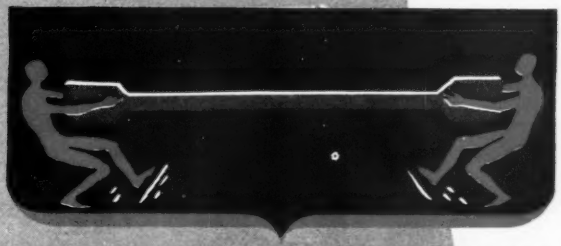
Sales Agents in Principal Cities

TO RESIST HEAT COMPOUND GR-S STOCKS WITH THE

VULTACS..

PRODUCE UNUSUAL RESISTANCE TO TEAR...

RETAIN TENSILE STRENGTH AFTER AGING...



MAINTAIN ELONGATION AT ELEVATED TEMPERATURES AND AFTER AGING

IMPART:

Easy Processing Characteristics
Improved Pigment Dispersion
Effective Tack to GR-S Formulations

	VULTAC #1	VULTAC #2	VULTAC #3
Derivative of p-tert-amylphenol	Monosulfide	Disulfide	Disulfide
Sulfur content	13%	23%	28%
Color and form	Soft brown resin	Hard brown resin	Hard brown resin
Softening point ASTM E28-36T	45-55°C	55-65°C	70-80°C
Specific Gravity 25/25°C	1.11-1.12	1.16-1.17	1.19-1.20
Recommended Use	General Purpose Vulcanizing Tackifier	Primary Vulcanizing Agent for GR-S	Primary Vulcanizing Agent for Buna N polymers
Recommended Proportion	10-35 parts PHR with decreased sulfur	4-10 parts PHA	5-9 parts PHR

Literature and Samples on request

Address all inquiries to SHARPLES CHEMICALS INC., Development Department, 123 South Broad Street, Philadelphia 9, Pa.

ARMY NAVY

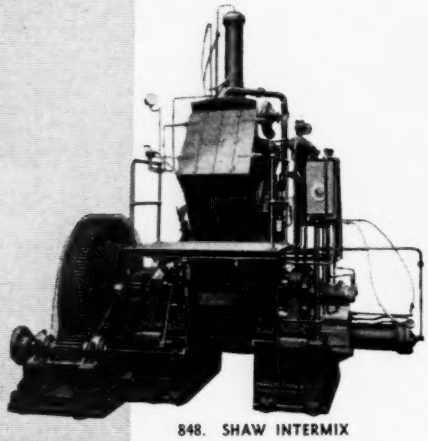
SHARPLES CHEMICALS INC.

PHILADELPHIA CHICAGO NEW YORK

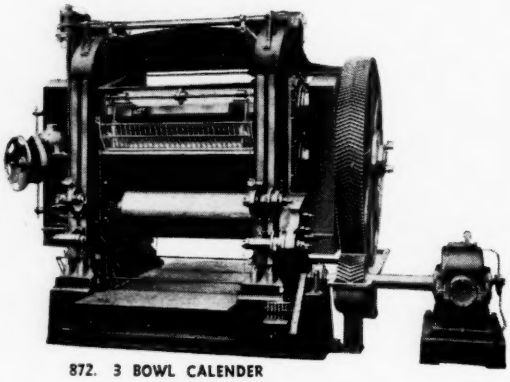
SHARPLES TRADE MARK CHEMICALS

Throughout the range of processing plant for the rubber industry ... SHAW MACHINES HAVE BEEN OUTSTANDING FOR OVER 65 YEARS

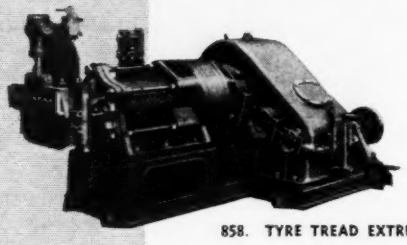
SHAW



848. SHAW INTERMIX

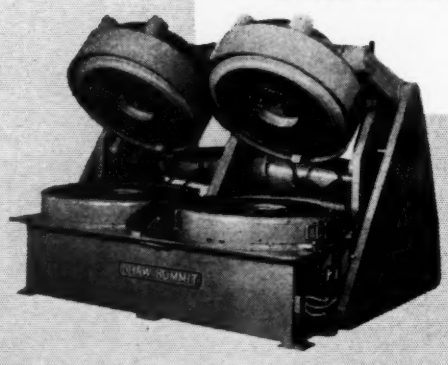


872. 3 BOWL CALENDER



858. TYRE TREAD EXTRUDER

908. DUAL TYPE TYRE PRESS



Tyre plants and general rubber processing factories in many parts of the world are relying today on the sturdy service given by Shaw machines. The buyer of tomorrow can depend upon the maintenance of the same high quality backed by sound technical advice, when he specifies a Shaw product.

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Quality in quantity shapes success... increases product potentialities. That's why, wherever *reagent grade mineral acids or ammonia in commercial quantities* are specified for industrial operations, General Chemical "B&A" high purity products are an outstanding choice nation-wide.

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"B&A" Ammonium Hydroxide, Reagent, A.C.S.
Sp. Gr. .90
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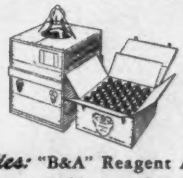

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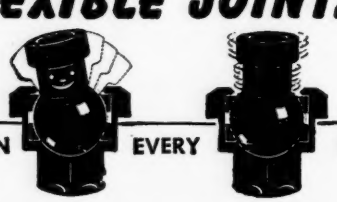

Not just a swivel joint...but a combination of a swivel and ball joint with rotary motion and responsive movement through every angle.

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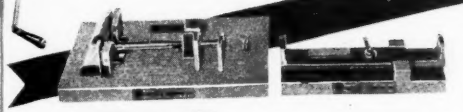
To its present line of over 2,500 items of Scientific Research and Production Control Equipment, "Precision" introduces a complete line of Rubber and Plastics testing apparatus. Shown below are a few representative items. "Performance Tested" and approved by our own and other leading laboratories throughout the country, this equipment embodies the same engineering features and high standards of workmanship found in all other "Precision Products".

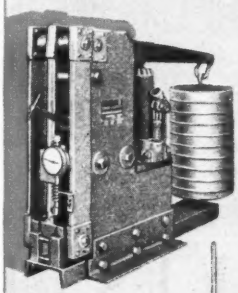
"PRECISION"-SHELL CONTINUOUS FLOW REFRACTOMETER
Indicates purity thru refractive index. Connected directly into processing pipeline.

AGING JIG
Naval Research Laboratory Rubber Seal Aging Test Jig. Used to test rubber gaskets to specification 33R9 INT. Duplicates service conditions.

PERMANENT SET TESTING APPARATUS
For tension testing of rubber. ASTM D-412-41 and Federal Specification ZZR-601. Holds 6 samples. Individual clutches for each sample.

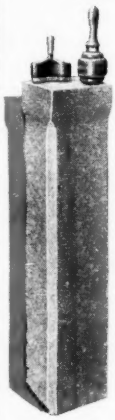


CRESCENT TEAR TEST JIG
Used for slitting the crescent tear test pieces according to A.S.T.M. D-624. The slitting depth gage on the right also furnished.



FLOW TESTER ASTM D-530
For measuring flow of hard rubber and plastic under pressure. Equipped with dial indicator.

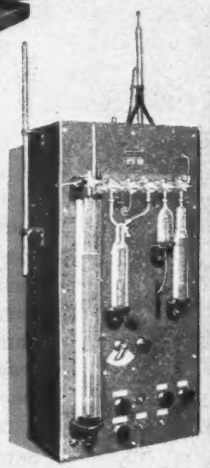
PRECISION TEAR TESTER
Utilizes ¾" diameter disc sample died from regular tensile slab. Fits standard tensile machines. Consistent and rapid in operation. Duplicates service conditions.



DIES
Dies of all sizes for tensile and tear tests, including 2" x ½", 2" x ⅛", 1" x ¼", 6" x 1", and 1.129" diameter. All to ASTM specifications.

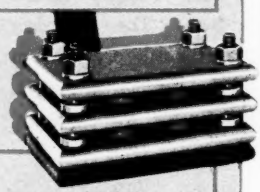
DIE BLOCK
For cutting tensile test pieces. Made from carefully selected end maple 8" square. Convenient 3 ft. height. Mounted on sponge rubber to absorb shock.

MALLET
For dieing test samples. Durable rawhide shockproof construction.



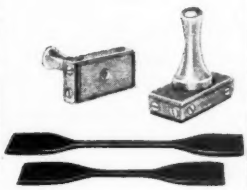
"PRECISION"-SHELL BUTADIENE ANALYZER
Determines butadiene by Gas-Volumetric Method.

PRECISION-ZAHN VISCOSIMETER
For fast, accurate viscosity measurements of cements and solutions. Test can be run in less than a minute. Supplied in 5 orifice sizes.



COMPRESSION SET TESTER ASTM D-395 METHOD B
Holds 8 specimens. Bench plate makes this apparatus extremely easy to handle. The usual spacers are replaced with washers which cannot become lost.

COMPRESSION FATIGUE CELLS
Used to confine rubber under compression for long periods during which time compression fatigue is measured by observing the decrease in the pressure exerted by the sample.



GAGE MARKER
For marking elongating marks on tensile test pieces makes both the 2" and 1" marks. Fine line produces less error. Light weight, made to fit the hand.

"PRECISION"-BASHORE RESILIOMETER
A necessity for synthetic development and compounding since resilience can no longer be taken for granted in an elastomeric compound.

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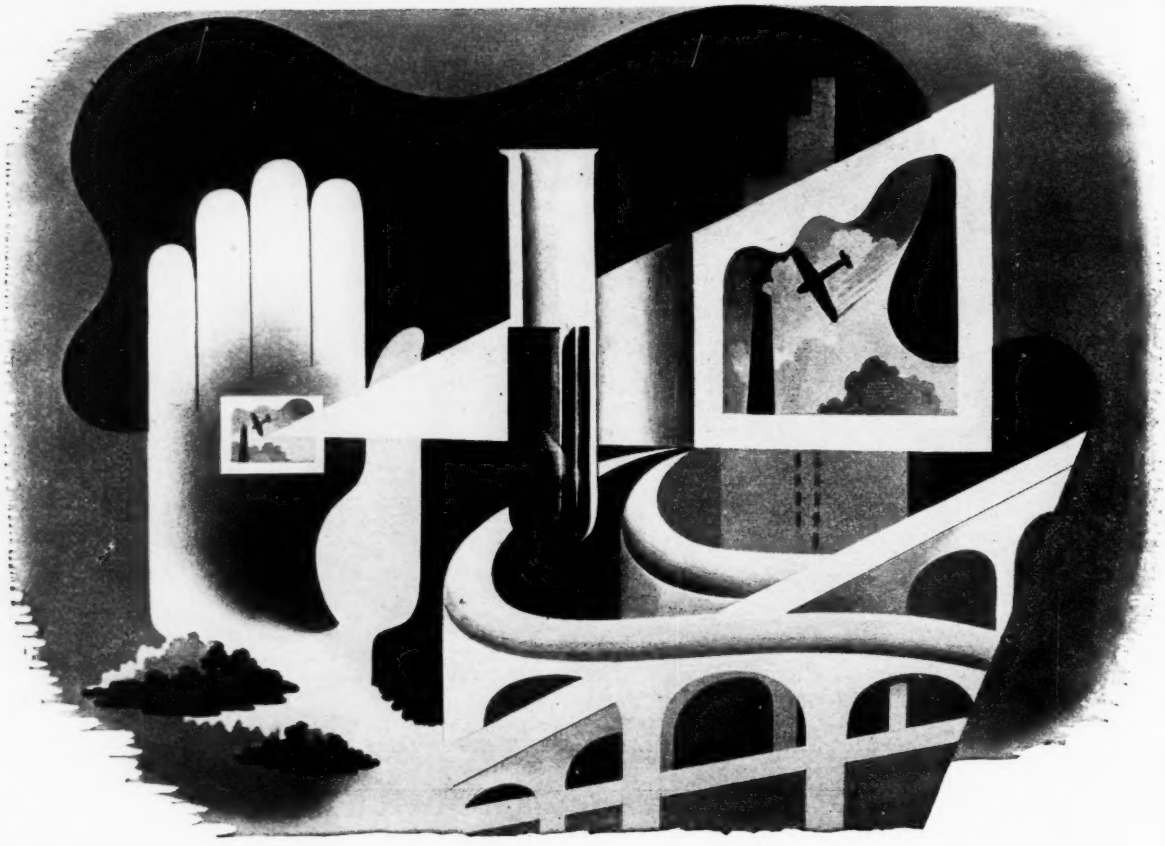

VISIONARY DREAMS

In test tubes fired by war, chemical research has laid the foundation for far-reaching prosperity. New products have been created, new bases developed, new techniques evolved which stagger the imagination . . . which translate today's dream into tomorrow's demand. How this research will affect your business, what it can do for your product, is obviously impossible to ascertain except by expert examination . . . and such examination should certainly be included in your post-war planning. Our staff of expert finishing engineers will be glad to cooperate with your organization. Your inquiry incurs no obligation. Address The Stanley Chemical Company . . . manufacturers of Stanley Lacquers, Synthetics, Enamels, and Japans . . . East Berlin, Connecticut.

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Setting *New* Standards of Performance . . .

For a Coal Tar Type softener and plasticizer PICCOVOL is now giving to many in the Industry new conceptions of possibilities for product improvement . . . PICCOVOL was developed to meet the specifications of Rubber Reserve Company — but it also provides greater tear resistance, higher tensile, improved elongation and better aging qualities in the finished products . . . It is available now in unlimited quantities.

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Manufactured by Pennsylvania Industrial Chemical Corp.

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Just a *Souvenir*

. . . souvenir of the time when TITANOX pigments contributed sparkling whiteness to a wide range of natural rubber products. But a token as well of brighter days that approach.

Until those days are here again, it is well to remember that just as TITANOX pigments have the greatest whitening effect on natural rubber, so also do they have on GR-S and reclaim.

TITANOX

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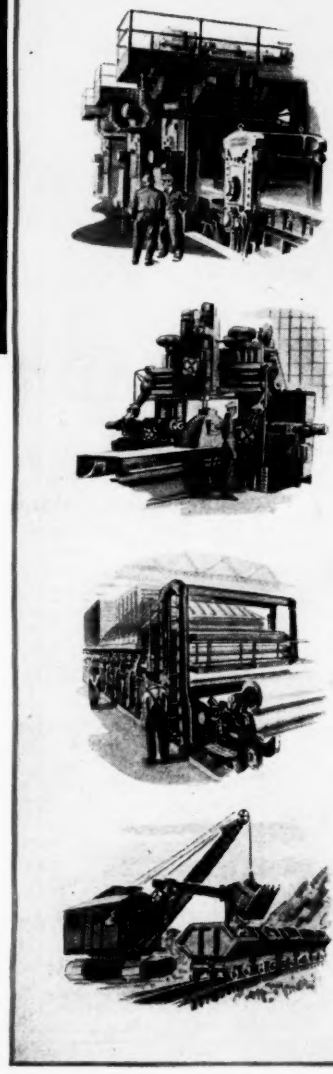
Tapered Roller
TIMKEN BEARING
EQUIPPED



Universal Acceptance

In virtually every industry the use of Timken Tapered Roller Bearings has been standard practice for years. The Timken Bearing is the most widely used and best known anti-friction bearing in the world. Industry acknowledges its exclusive and outstanding advantages. Countless thousands of different applications and a solid scientific background have given The Timken Roller Bearing Company the knowledge and experience so vitally necessary to make the precise bearing recommendation for every type of machinery. Timken Roller Bearings represent a highly specialized engineering service of inestimable value to American industry. Timken Bearings mean dependable performance — are universally accepted as the world's most advanced anti-friction bearing.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO

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TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

BUY WAR BONDS

Conclusive Evidence

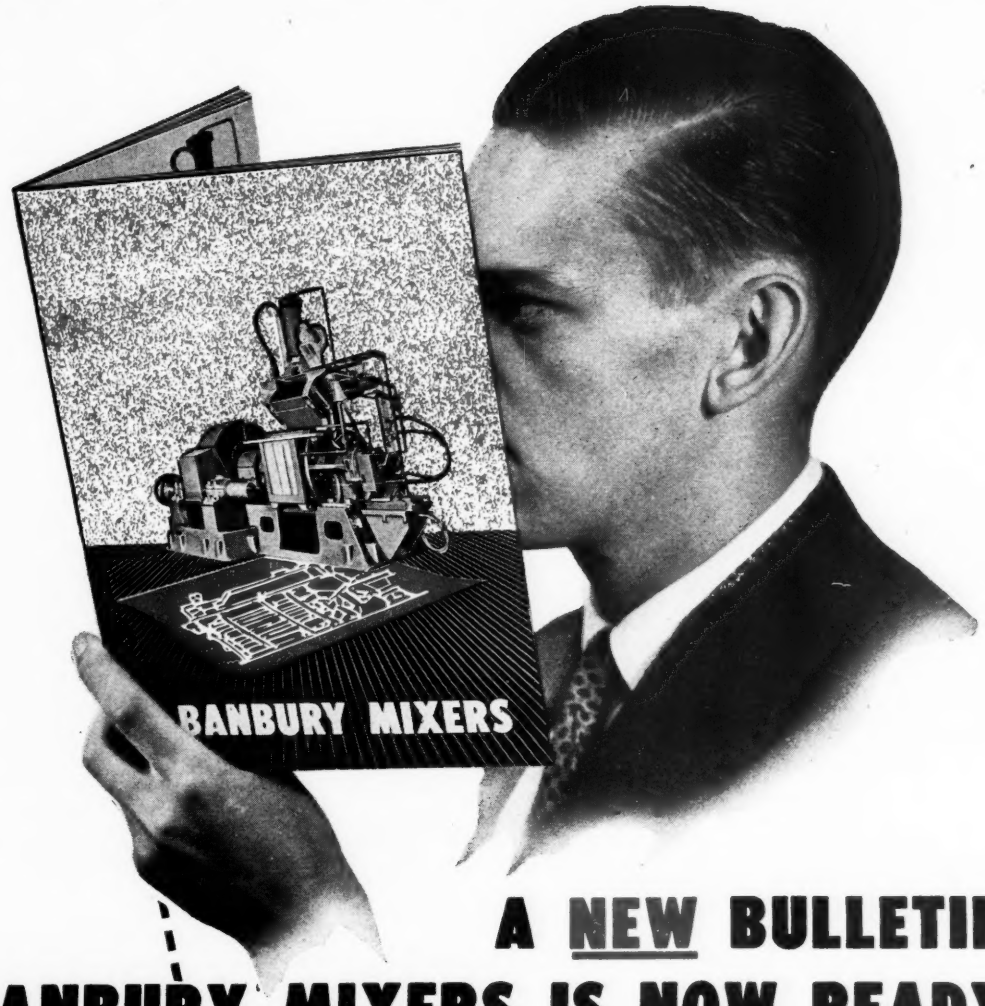
Management faces grave responsibilities in the postwar era. Certainly, one of them is the necessity for a maximum degree of efficiency and economy in manufacture. Here is where the selection of the best sources of supply for the materials used in production is of major importance.

In order to gauge properly the value of the St. Joseph Lead Company as a source of supply for its justly famous, lead-free zinc oxides, the following procedure is as simple as it is conclusive: Ask anyone of the many manufacturers in the rubber, paint and allied industries who use St. Joe Zinc Oxides — or any score of them — what they think of this Company, and they will tell you that the quality of the products and service we give them justifies the orders they give us.

ST. JOSEPH LEAD COMPANY

250 PARK AVE., NEW YORK, N. Y.

MADE BY THE LARGEST PRODUCER OF LEAD IN THE UNITED STATES



A NEW BULLETIN ON BANBURY MIXERS IS NOW READY

A FEW BANBURY ADVANTAGES

1. More uniformly mixed stocks produced.
2. Positive, automatic, mechanical control of entire mixing procedure.
3. Savings in production costs often sufficient to pay for an installation in a year or less.
4. Less floor space for equal output.
5. More efficient and economical handling of materials.
6. Close control of mixing temperatures.
7. Safer and cleaner operating conditions.
8. Variety of materials, colors or formulas processed without difficulty.

THIRTY-TWO pages of description and illustrations give up-to-the-minute details of the latest developments in Banbury Mixers.

The many applications of this money-saving and product-improving machine in the rubber, plastics, linoleum, asphalt, paint and other fields are discussed . . . features of design and construction are described . . . a table of sizes, capacities, dimensions, etc., is included . . . specific information on installation and operation is given.

A number of photographs illustrating the various sizes and types of machines for different applications are shown. Drawings of typical arrangements of Banbury Mixers with auxiliary equipment are also included.

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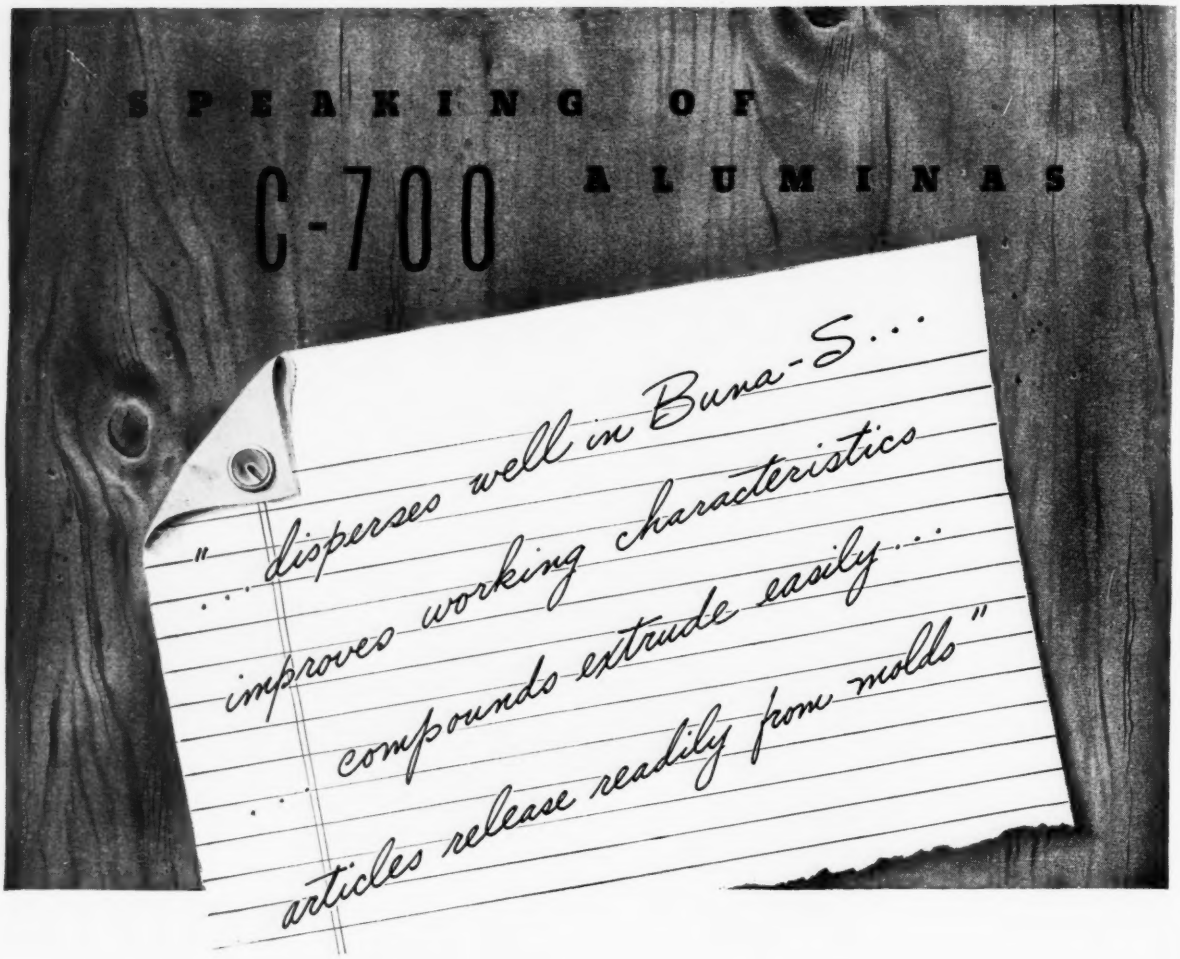
Plants: Ansonia and Derby Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles

Farrel-Birmingham



Reports on the use of C-700 Aluminas with synthetics, like that quoted above from compounder's statements, give promise of an extremely useful future. Because of the newness of the synthetic rubber industry, less is known of the requirements for fillers there. But we're learning.

Uniform fineness — To this property of C-700 Aluminas rubber compounders assign considerable credit. It helps account for the superior performance obtained when these reinforcing pigments are used with natural rubber, the greater volume of finished product from a fixed amount of crude, the easier manipulation of stock.

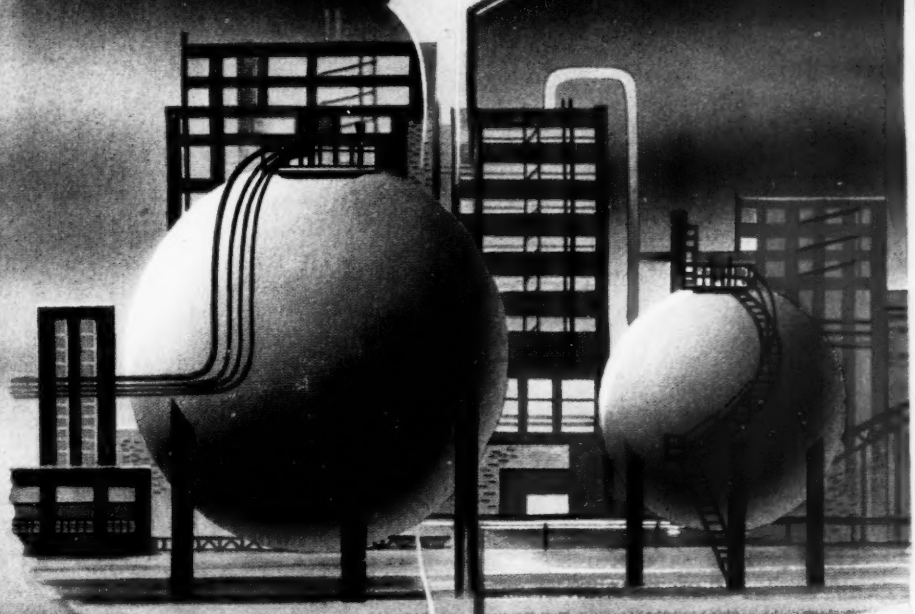
To manufacturers who are wondering about means of improving rubber products, we offer every facility at our command. For samples of C-700 Aluminas to test in your processes, write ALUMINUM COMPANY OF AMERICA *(Sales Agent for* ALUMINUM ORE CO.,) 1909 Gulf Bldg., Pittsburgh 19, Pa.

ALUMINUM ORE COMPANY

ALORCO

Aluminum and Fluorine Compounds

SYNTHETIC RUBBER LATICES
COMPOUNDED AND UNCOMPOUNDED



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DIVISION OF UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, NEW YORK 20, N. Y.
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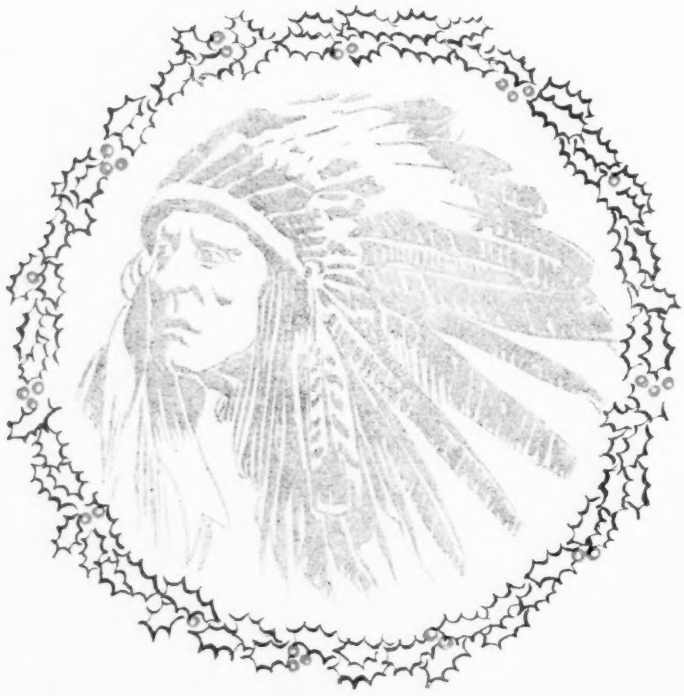

On this Fourth War-time Christmas

We extend to you our best wishes

and our hope for early peace —

And Final Victory
In the New Year

PEQUANOC RUBBER CO.

QUALITY RECLAIMS FOR SPECIFIC PURPOSES

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Intensive Mixers

BIG··RUGGED··EFFICIENT

NEW TYPES NOW AVAILABLE FOR EVERY DIFFICULT OPERATION IN THE RUBBER INDUSTRY

Heavy Duty Dispersers for Cements and Coatings. Masticators and Internal Mixers for Breaking-down, Warming and Compounding all Stocks. Working Capacities from 1/8 to 3600 Gallons. Input Ratings up to 1000 Horsepower. AND OFFERING MOST NOTEWORTHY IMPROVEMENTS IN DESIGN AND PERFORMANCE SINCE WORLD WAR I.

SW

Write today for particulars on the most complete line of Heavy Duty Kneading Machines in America!

STRUTHERS WELLS CORPORATION

NORTHMASTER DIVISION TITUSVILLE, PENNSYLVANIA

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Retards Solvent Damage

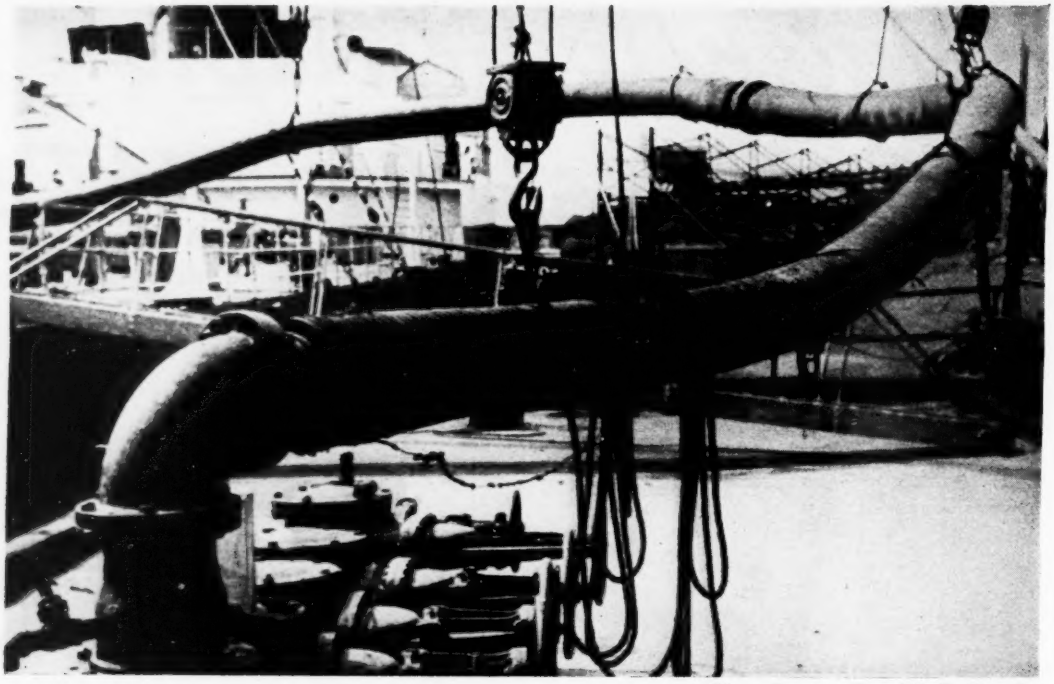

Photo Courtesy Republic Rubber Co.

OIL, the lifeblood of modern warfare, requires a special hose compound for satisfactory handling. PELLETEX and GASTEX, world's leading semi-reinforcing black pigments, supply that something which enables the rubber or synthetic compound to combat the destructive forces of solvents and thus prolong the life span of the hose.

For nearly twenty years General Atlas engineers have studied the problem of developing the type of hose best suited for handling such materials as gasoline, crude oil, chemicals, paint, and steam. Today PELLETEX and GASTEX are used in the tube, friction, and cover of a wide variety of hose, both in war and peace; afloat and ashore.

We invite your inquiry for product planning after Victory.

HERRON BROS. & MEYER

OHIO BLDG., AKRON, OHIO.

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PELLETEX TRADE MARK

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FOR DIFFICULT PLASTICIZING JOBS LIKE THESE . . . INVESTIGATE

Paraplex G-25

APPLICATION	ELASTOMER	ADVANTAGES OF PARAPLEX G-25
Cable Jackets	Polyvinyl chloride and acetate copolymers	Non-migration, permanence, oil resistance, low heat deformation.
Cable Lacquers	Polyvinyl chloride and acetate copolymers	Non-migration, permanence, durability, heat stability.
Fabric and Paper Coatings	Polyvinyl chloride and acetate copolymers; cellulose acetate butyrate; cellulose acetate propionate; Neoprene, Buna N	Non-migration, oil resistance, durability, high finish, permanence, gloss, freedom from taste and odor.
Rigid Moldings	Polyvinyl chloride and acetate copolymers; polyvinyl chloride-Buna N blends	Good processing, toughness, low heat deformation.
Free Films	Polyvinyl chloride and acetate copolymers; acrylic polymers (ACRYLOIDS)	Good processing, toughness, permanence, oil resistance, non-migration.
Hot Melts	Polyvinyl acetate and copolymers	Heat stability, low acidity, permanence, freedom from taste and odor, wide compatibility range.
Gasket Stocks	Buna N; Neoprene; polyvinyl chloride and copolymers	Oil resistance, low temperature flexibility, permanence.
Gasket Coatings	Polyvinyl chloride and acetate copolymers; Buna N; Neoprene	Oil resistance, permanence.
Extruded Hose and Tubing	Polyvinyl chloride; polyvinyl chloride-polyvinyl acetate copolymers; Buna N; Neoprene	Oil resistance, non-extractability, permanence, facilitates processing.
Seam Sealing Compounds for Metal Containers	Polyvinyl chloride and acetate copolymers, Buna N	Permanence, heat stability, resistance.
Can Linings and Closures	Polyvinyl chloride and acetate copolymers; thermosetting phenol formaldehyde resins	Permanence, resistance, freedom from taste.
Cements	Polyvinyl chloride and acetate copolymers; Buna N; acrylic polymers (ACRYLOIDS)	Tack, permanence, non-migration.
Pressure Sensitive Adhesives	Polyvinyl chloride and acetate copolymers; acrylic polymers (ACRYLOIDS)	Non-migration, permanence, heat stability, tack.
Nitrocellulose Lacquers	Cellulose nitrate	Durability, non-migration, permanence.

THESE applications represent the fields in which PARAPLEX G-25 has already demonstrated its usefulness in the short time since its introduction by The Resinous Products & Chemical Company. The unusual properties of this non-migrating, oil-insoluble plasticizer suggest a much broader scope of utility. We shall be glad to work with you in studying the adaptability of PARAPLEX G-25 to your difficult plasticizing problems.

7 awards to The Resinous Products & Chemical Company and its associated firms, Rohm & Haas Company and Charles Lennig & Company.

PARAPLEX *and* ACRYLOID *are trade-marks, Reg. U.S. Pat. Off.*

Represented in South America by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina, and offices in principal South American cities.

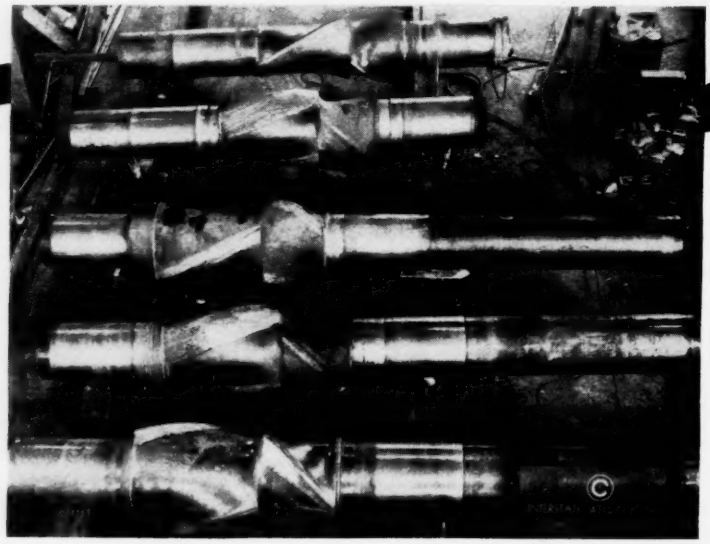
THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

for Longer Banbury Service—

Rebuilding and Hard-Surfacing Rotors to *Exact* Clearances . . .

It is Interstate's way of doing the job right for longer resistance to the wearing action of hard service . . . Our engineers know the requirements of every part of the Banbury Mixer — and how to meet those requirements by rebuilding, hard-surfacing and precision-finishing to produce results that give highest mixing efficiency over longer periods of sustained operation . . . Here are five rotors from number 27's going through Interstate's hard-surfacing department — being built up to give correct contours for better mixing service . . .



Repairing and rebuilding Banburys is our specialty. When yours needs attention write, wire or phone us at once.

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IWS

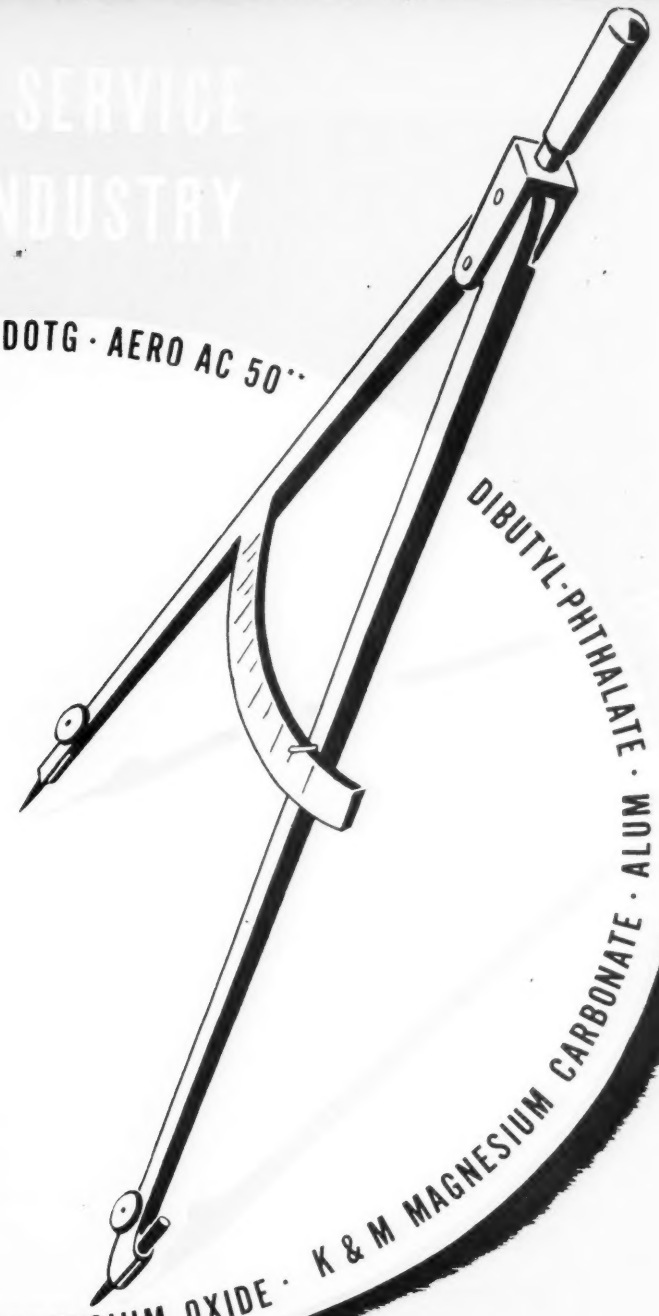
INTERSTATE WELDING SERVICE

Main Plant: 914 Miami Street . . . AKRON 11, OHIO . . . Phone: JE 7970

EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

AERO BRAND ACRYLONI

A WELL-ROUNDED SERVICE TO THE RUBBER INDUSTRY



AERO BRAND ACRYLONITRILE · AERO BRAND DPG · AERO BRAND DOTG · AERO AC 50** · DIBUTYL-PHTHALATE · ALUM · K & M MAGNESIUM CARBONATE · K & M MAGNESIUM OXIDE · AERO BRAND RUBBER SULPHUR ·

Cyanamid's "controlled quality" production of chemicals for the rubber industry is the key to the dependability of these materials which is helping to maintain fast and economical processing schedules for the war effort and essential civilian uses. This, coupled with the strategic locations of Cyanamid warehouses, assure quick deliveries of quality chemical supplies to all centers of the rubber industry.

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:

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30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

An Announcement of Importance to all Interested in CHLORINATED RUBBER!

CHLORINATED ISOPOL

AVAILABLE IN METAL PRIMER FORMULATIONS* AND IN POWDER FORM

GENERAL DESCRIPTION:

An original (synthetic) development of the UBS Laboratories that is very similar to Chlorinated Rubber in form and all other characteristics so far tested, but which is not yet standardized in Viscosity Range.

GENERAL CHARACTERISTICS:

Flame Resistance	Excellent — Similar to Chlorinated Rubber
Moisture Resistance	Excellent — Similar to Chlorinated Rubber
Chemical Resistance	Excellent — Similar to Chlorinated Rubber
Solubility	Appears to be soluble in the same solvents customarily used for Chlorinated Rubber.
Stability	Is stabilized. However, in some operations, more stabilizing material will be required.
Compatibility with Plasticizers	Appears to be compatible with the same plasticizers customarily used with Chlorinated Rubber

SUGGESTED USES:

1. As a primer for rubber-to-metal adhesion and as an ingredient in adhesives.
2. As an acid and alkali-resistant coating for metal, concrete and other surfaces.
3. As an ingredient in paints, lacquers, inks, etc., where chemical resistance and flame resistance are desired.
4. For fire-proofing fabrics and other materials.
5. For moisture-proofing fabrics and other materials.
6. Wherever sound and heat insulation qualities are important.
7. As a plastic wherever inertness to chemicals and fire-proofness are important.

AVAILABILITY:

Production at present is sufficient to enable sampling and service of reasonably sized orders, but large quantity orders can not be filled until new, expanded production facilities are in operation.

***METAL PRIMER FORMULATIONS OF CHLORINATED ISOPOL**

The UBS Laboratories have had considerable success formulating Chlorinated Isopol into Metal Primers for protective coatings and for rubber-to-metal cementing operations; and have developed several Tie Cements that work extremely well with the available types of synthetic rubber. However, experience has shown that each rubber-to-metal cementing job should be treated as an individual problem. Therefore, in inquiring, please inform us whether your problem is one of protective coating or of cementing; and if it is a cementing problem, please also include in your letter as much as possible of the following information: (1) Type of rubber to be adhered; (2) Type of metal to be used; (3) Whether metal can be sand-blasted or buffed; (4) Whether heat and/or pressure can be applied, including temperature ranges, pounds pressure and lengths of time possible; (5) Strength of bond required; (6) Temperature range under which bond must hold; (7) End use of product.

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

UNION BAY STATE *Chemical Company*

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS • SYNTHETIC LATEX • SYNTHETIC RUBBER
PLASTICS • INDUSTRIAL ADHESIVES • DISPERSIONS
COATING COMPOUNDS • IMPREGNATING MATERIALS
COMBINING CEMENTS

Technical Bulletin No. 5

on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

COMPOUND No. 5	
GR-S	100.0
Sulfur	3.0
B.J.F.	2.0
E.L.C. Magnesia	5.0
Cumar MH 2½	7.5
Zinc Oxide	100.0

Results with B. J. F. Acceleration

THIS Compound shows a lower "state-of-cure" in comparison with the previous four compounds, but the pendulum, rebound and heat generation characteristics are satisfactory. The cut-growth resistance is outstandingly good.

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength Lb./Sq. In.	Per Cent Elongation	Load (Lb./Sq. In.) For Elongation of				Permanent Set
			200%	300%	400%	500%	
7.5	830	795	115	150	225	340	.26
15	1370	750	155	195	315	510	.29
30	1440	655	195	310	465	660	.29
45	1320	610	240	360	520	800	.24
60	1385	605	230	345	500	810	.24
90	1620	620	230	385	540	845	.26

Time of Cure Min. at 45 Lb.	Shore Hardness	Goodyear-Healey Pendulum		Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Inches Failure at	
				Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression			
		Indentation in mm.	Per Cent Rebound				Initial	Final	4,000 Cyc.	13,000 Cyc.
90	46	8.34	60.2	23.9	15'-4.7	16.9	16.6	19.5	.05	.19

*Test Conditions: 100 Lb. Load. 0.15" Stroke. 100°C. Oven Temp.

Use Uniform Quality

HORSE HEAD ZINC OXIDES

THE NEW JERSEY ZINC COMPANY

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SPECIAL ATTENTION IS BEING GIVEN TO THE NEEDS OF MANUFACTURERS OF PRODUCTS SUCH AS INSULATED WIRE FOR WHICH UNIFORM MELTING POINT AND FREEDOM FROM IMPURITIES ARE REQUIRED.

AVAILABLE IN A RANGE OF MELTING POINTS FROM 265 TO 310° F.

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ARE YOU *Prepared?*

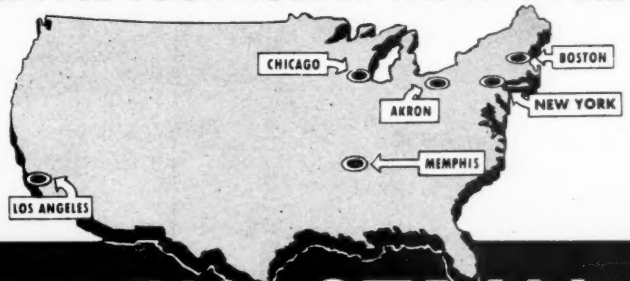
We invite consultation respecting your rubber requirements for after-the-war production

SYNTHETIC • CRUDE • SCRAP

Rubber

Also HARD RUBBER DUST *and* BALATA

LET US SERVICE YOUR RUBBER RESERVE PERMITS



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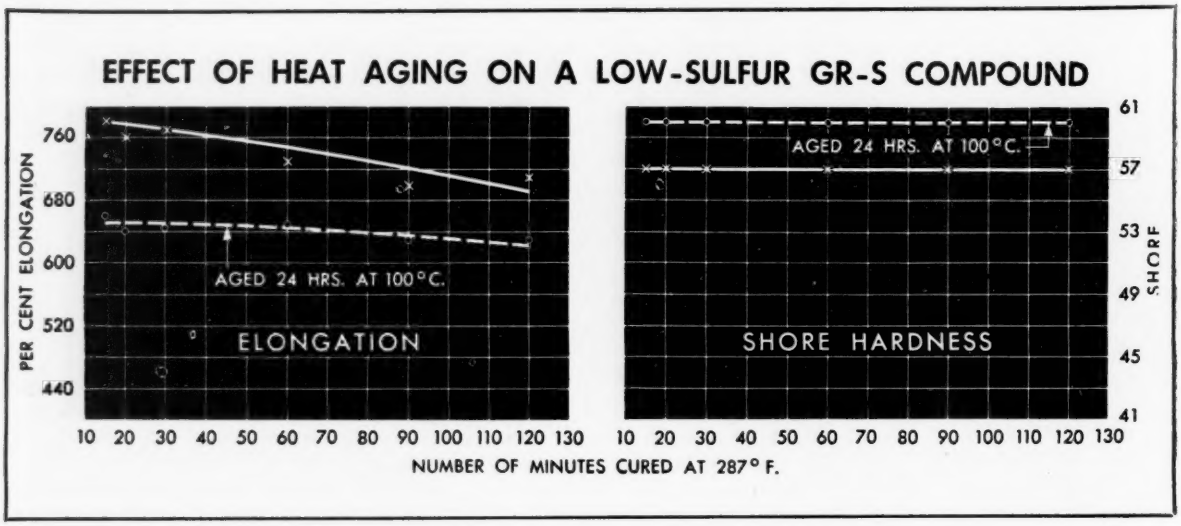


Physical Properties of GR-S Compounds Stay Put with New Low-Sulfur Formula

Heat resistance now made practical by F.B.S LITHARGE

FORMULA

GR-S (Institute)	100
E.P.C. Carbon Black	40
Sulfur	0.75
Zinc Oxide	3.0
Benzothiazyl Disulfide	1.0
F.B.S. Litharge	1.5
Coaltar softener	5

Data:

Time 287° F.	Tensile Strength	% Elong.	Modulus 300% Elong.	Shore Hardness
15	2890	780	640	57
20	3010	760	660	57
30	3090	770	660	57
60	2960	730	660	57
90	2850	700	685	57
120	2960	710	700	57
Aged 24 Hours at 100° C				
15	2970	660	980	60
20	3030	640	1020	60
30	2980	645	1000	60
60	3260	650	1040	60
90	3060	630	1130	60
120	2930	630	1010	60

OUTSTANDING CHARACTERISTICS:

The F.B.S. Litharge-thiazole combination used with low sulfur is characterized by the following:

1. Heat stability • **2.** Fast curing rate • **3.** High flat modulus **4.** Excellent general physical properties • **5.** Processing safety **6.** Efficiency • **7.** Economy.

High retention of physical properties . . . how important is that to you?

Your GR-S can have it, merely by changing to a low sulfur formula.

Now such a compound can be cured in a practical time and without extra quantities of accelerator.

F.B.S. Litharge plus benzothiazyl disulfide is what produces safe, fast cures with low sulfur content.

The curing period can be varied from 15 to 120 minutes with scarcely any effect on elongation, hardness or modulus.

Moreover, the effect of aging on samples cured for various periods is almost uniform.

Reference to the accompanying tables and charts should be convincing.

• • •

Ask us to send you a printed report, "Compounding of GR-S for Heat Resistance," issued by the Rubber Division of our Research Laboratories, which covers the subject of F.B.S. Litharge for low sulfur formulas in greater detail and from a number of additional angles. Write to

NATIONAL LEAD COMPANY

Rubber Division: 105 York Street, Brooklyn, N. Y.

New York, Buffalo, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco: Boston (National-Boston Lead Co.); Pittsburgh (National Lead & Oil Co. of Penna.); Philadelphia (John T. Lewis & Bros. Co.).

Choose your opening where you want it!

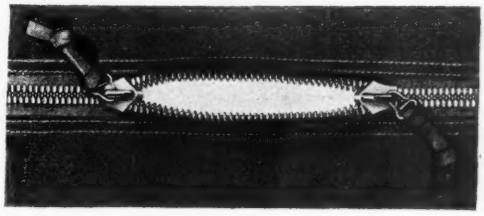
New "double-acting" Crown Zipper permits two or more sliders on one track—opens at given point—spells new convenience in postwar rubber applications!

In the thick of the mud, blood, sweat and strain of today's fighting, hundreds of military items equipped with Crown Zippers are proving zippers can be big and tough yet amazingly easy to operate, small and dainty yet virtually indestructible!

One of the most sensational Crown developments is a zipper that permits two or more sliders on one track — opens instantly at any given point. (One recent Crown application actually has *ten* sliders!)

This amazing Crown Zipper feature, coupled with four other basic superiorities over old-style, conventional zippers (see list below), will result in new convenience, easier operation, in postwar rubber goods. Heavy boots, raincoats and boat covers are but a few of the many items Crown Zippers will fasten better.

When *you* turn to postwar products, Crown engineers, fresh from their experience in designing hundreds of military items, will work with your designers to adapt—or, if necessary, *create*—special zipper applications to meet your own manufacturing problems.



CROWN

ZIPPERS

are 5 ways better

1. Takes sharp curves

2. Die-cast for smoother action—extra strength

3. Provides opening wherever you want it

4. Won't lock open

5. Resists corrosion

Member of the J. & P. Coats • Clark's O N T *Family*

THE SPOOL COTTON COMPANY • *745 Fifth Avenue, New York, N. Y. (Crown Fastener Division)*

Serving Dependably—Speeding Production

★

★ **ADVAN**——New delayed action accelerator recommended for GR-S for footwear, hose covers, CV insulation, etc.

★ **ADVAGUM**——Synthetic thermoplastic used to assist processing of Buna N type synthetics.

★ **ADVAWET**——Series of powerful wetting out and emulsifying agents. Also suitable for stabilizing synthetic latices and dispersions.

★ **COPPER NAPHTHENATE**—Powerful mildewproofing agent. Meets all Armed Forces specifications.

★ **EXTENDER 15**—Extender for dibutyl phthalate and other plasticizers. Readily available.

★ **OROPLAST**——Extender and softener with outstanding smoothening quality when used with GR-S compounds for calendering, tubing and skim coating.

★ **PLASTOFLEX**——Series of efficient plasticizers for vinyl chloride resins. Good low temperature flexibility.

★ **PLASTOFLEX 10**——Replacement for dibutyl phthalate in Buna N type synthetics. Gives high resilience.

★ **PLASTICIZERS VA**—Plasticizer for vinyl acetate polymers as replacements for latex and for shoe adhesives.

★ **PLASTAC**—Tackifier and plasticizer for GR-S.

★ **RESIN V**—Tackifier for GR-S, also in adhesive work with GR-S latices.

★ **VISTAC**—Series of hydrocarbon polymers being used as tackifiers and processing aids for GR-S, Vistanex Polybutene and other rubbers.

★ **VISTANEX POLYBUTENE** — Isobutylene polymers for special purpose GR-S and synthetic insulation compounding. Outstanding for pressure-sensitive adhesive bases.

★ **ZINC NAPHTHENATE**—Colorless mildewproofing agent for fabrics such as duck, braid, etc. Meets government specifications.

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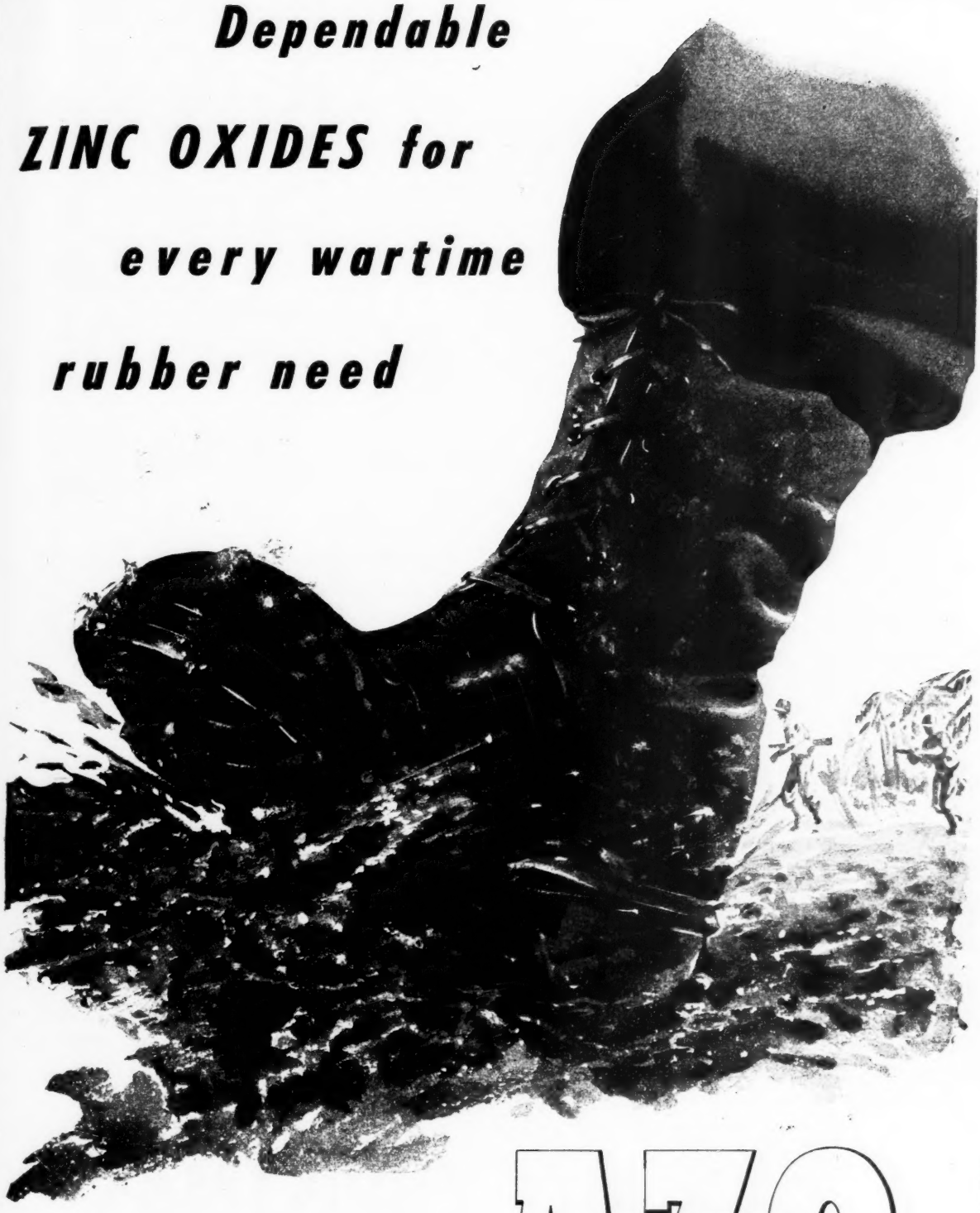
Dependable

ZINC OXIDES for

every wartime

rubber need



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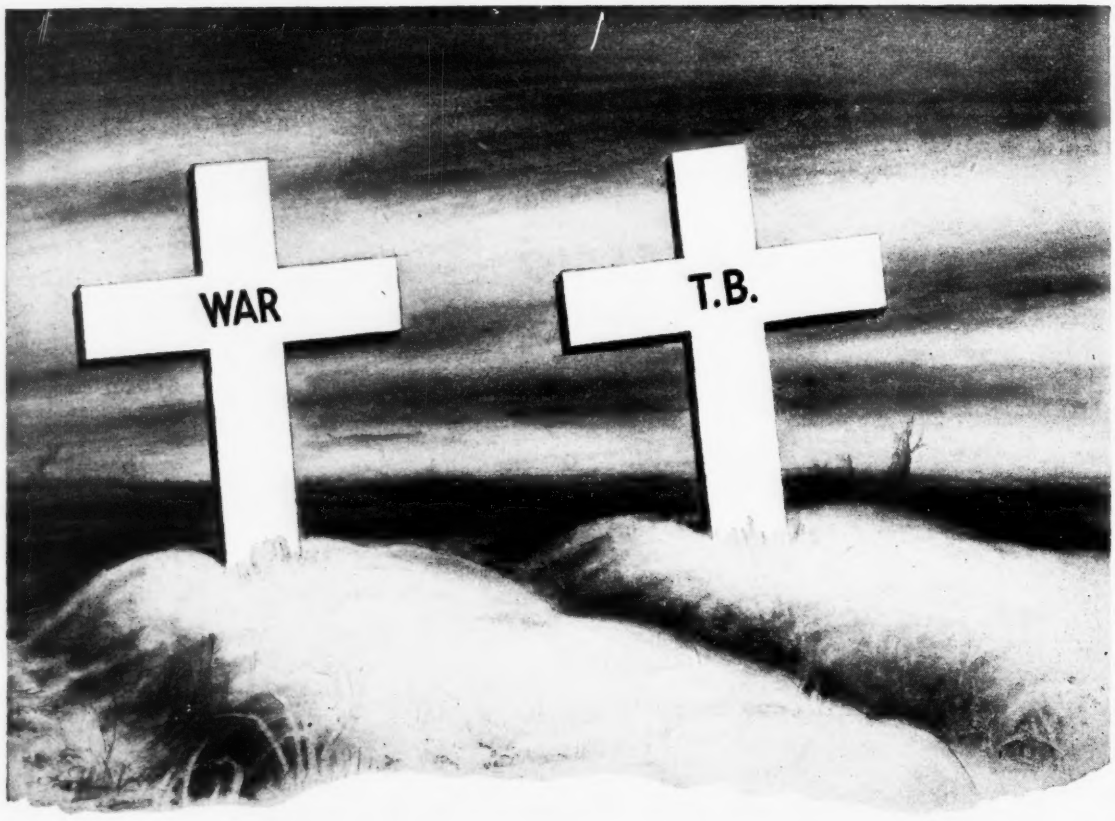


TWINS OF DEATH

• HAND IN HAND go War and Tuberculosis — the dread disease that since Pearl Harbor has exacted a toll of 145,000 civilians.

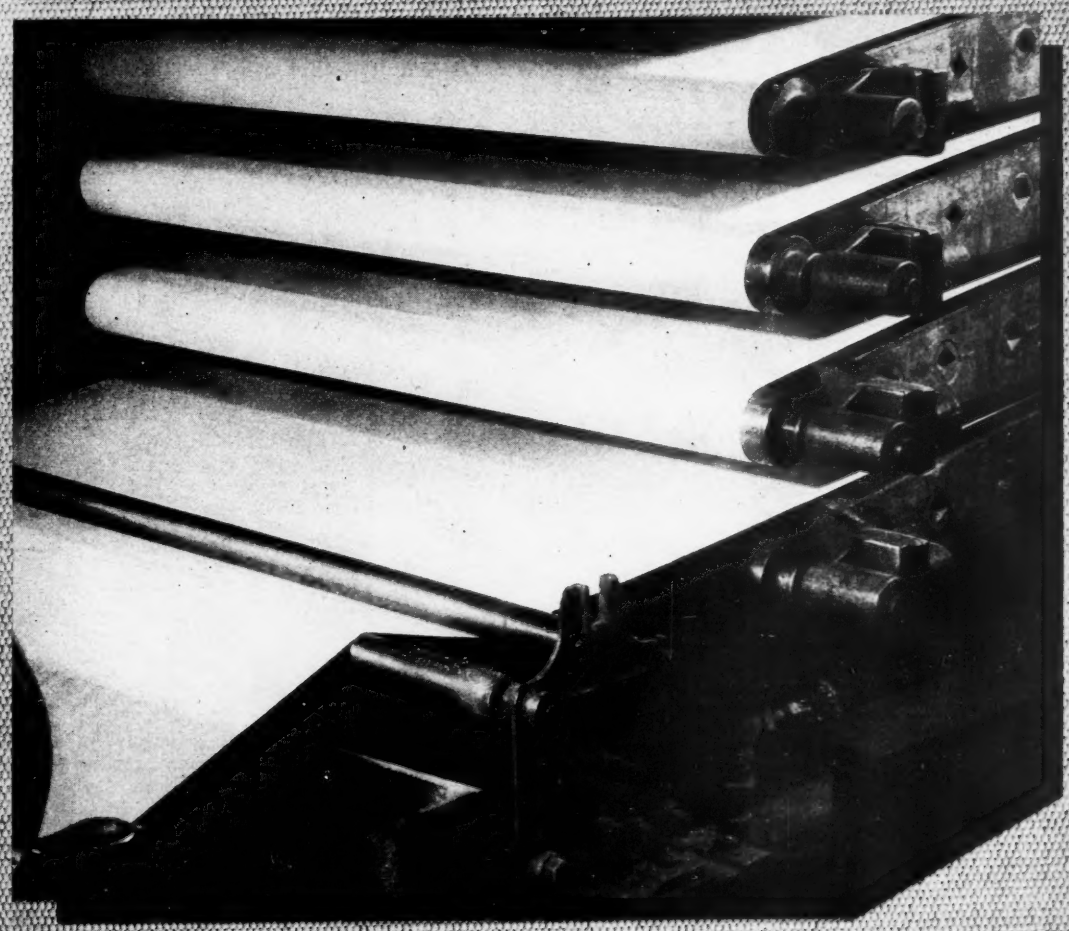
Wartime conditions — worry, overwork, abnormal eating and housing — are the *allies of TB.*

Yet Tuberculosis *can* be controlled. The annual sale of Christmas seals has helped cut the death rate by 75%! But the current death rate shows that the battle is *far from won* — that your dollars are needed now, urgently. *Please,* send in your contribution today.

BUY CHRISTMAS SEALS!

The National, State and Local Tuberculosis Associations in the United States

MT. VERNON FABRICS ASSOCIATED WITH UNIFORM QUALITY FOR OVER HALF A CENTURY



Laboratory Control Increases Fabric Uniformity

The high degree of uniformity found in MT. VERNON industrial fabrics cuts to a minimum your own fabric inspection operations. This characteristic in MT. VERNON fabrics is achieved by a rigid system of laboratory control that checks every step of their production. For more uniform fabrics that insure more efficient fabrication of your own products, specify MT. VERNON fabrics.

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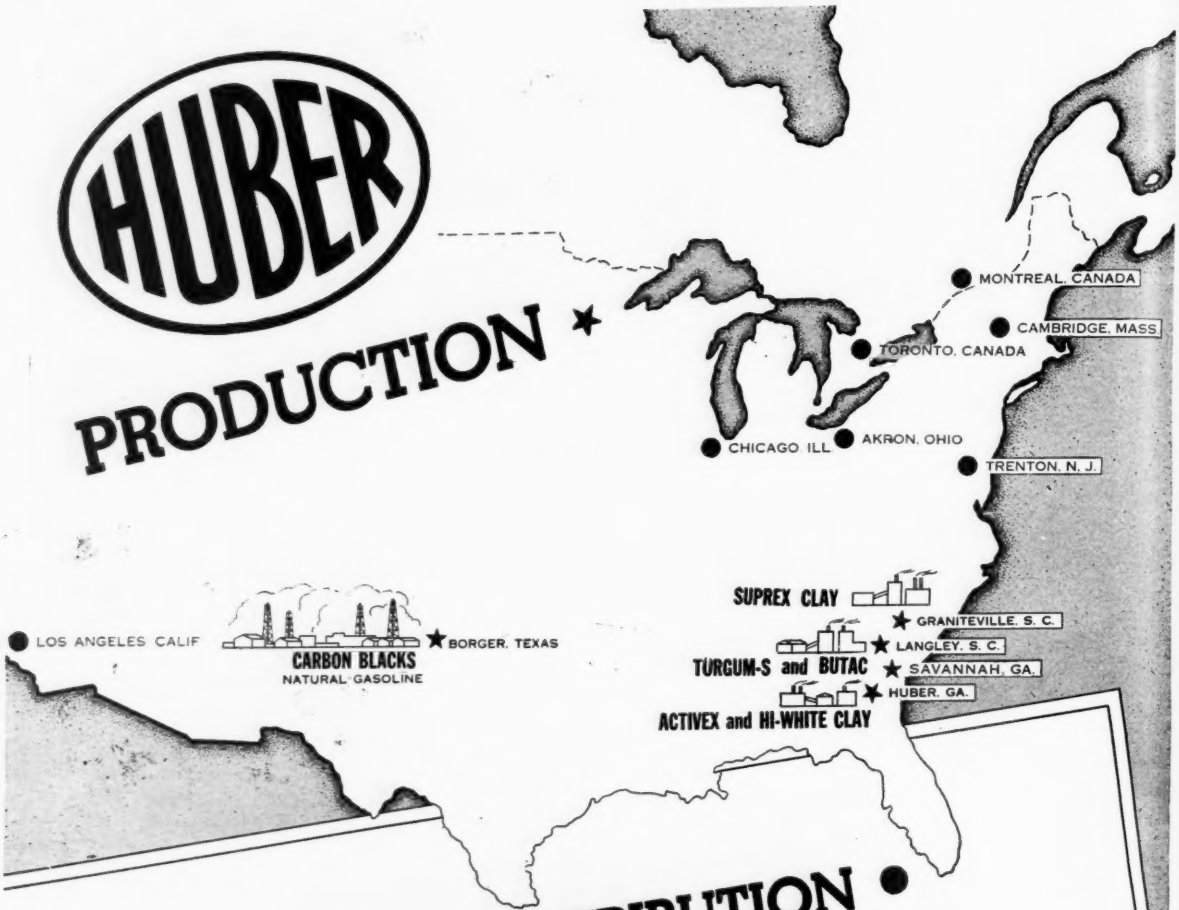

HUBER DISTRIBUTION

of RUBBER PIGMENTS and OTHER PRODUCTS

WYEX	—Easy Processing Channel Black
TX	—Medium Processing Channel Black
HX	—Hard Processing Channel Black
MODULEX	—High Modulus Furnace Black
CLAYS	—Suprex, Hi-White, Hydratex
JMH	—Chemical Peptizer for GR-S
ACTIVEX	—Activator for GR-S
BUTAC	—Plasticizer and Tackifier
TURGUM S	—Pine Gum Plasticizer (a solid)

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The Evaluation of Tear Resistance in Elastomers

Floyd L. Graves[1]

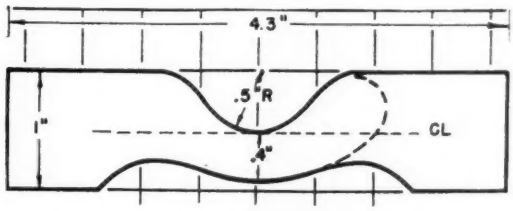
THE need of a tear resistance test that could be generally accepted by rubber technologists has long been recognized. Although a very common kind of failure in rubber goods, tearing has proved exceedingly difficult to evaluate with the degree of accuracy possible in other physical tests. Perhaps no property of rubber has had a greater variety of tests (1-12)[2] proposed for its measurement. Lefcaditis and Cotton (1) in developing one method investigated the possibilities of at least a dozen specimens which had been devised for this work.

It is not the intention in this paper to review the merits of the many tear test methods in use or proposed. The work has been confined to a study of the test specimen coming closest to general acceptance and to a new specimen designed as an improvement on the former. Reference is made to the Goodrich, or Winkelmann, crescent test piece which has been in use for more than 16 years and was adopted as tentative standard by the A.S.T.M. in 1941.

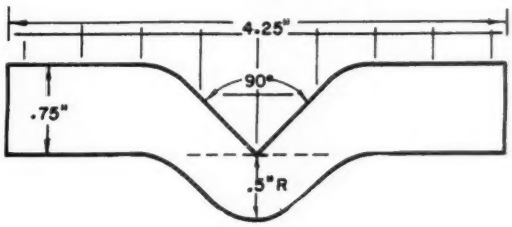
The principle of the crescent design is apparent upon examination of Figure 1. The curved test section makes possible the development of a stress gradient when the piece is stretched in a tensile machine. Tearing occurs when sufficiently high stress is attained at the apex of a cut, 0.02-inch deep, at the center of the concave edge. The value recorded for tear resistance is expressed as pounds pulled per unit thickness and is a composite measurement of the stress at the apex of the cut and of other stresses not involved in resistance to tearing.

Tearing has been defined by Busse (2) as the formation of new surfaces by the application of a small force in such a way that it is concentrated at the tip of a sharp indentation, or cut, in the sample. It therefore follows that the ideal specimen would measure the stress concentrated at this point of tearing to the exclusion of all other stresses present in adjacent areas. The values obtained with such a specimen would represent true tear resistance. Unfortunately it has not been practical to develop such a specimen for extensible materials. A compromise has been necessary in which stresses not involved in tear resistance are included in the measurement of the stress at the point of tearing. Because of the composite nature of such measurements, the values obtained with all tear specimens are significant only in a comparative sense. Likewise, values obtained with one-type specimen do not have significance in direct comparisons with values of a different specimen design.

If we consider again Busse's definition of tearing, we must conclude that, lacking the ideal specimen, any specimen to evaluate this property should be so designed that the stress at the point of tearing exerts the dominant influence on the value obtained, while other unavoidable stresses in the specimen are subordinated. This requirement is not met in the crescent specimen. Lefcaditis and Cotton (1) recognized this fault in 1932 when they observed that too great a proportion of the pulling force is



CRESCENT SPECIMEN
A.S.T.M. DIE B



ANGLE SPECIMEN

Fig. 1. Tear Test Specimens

[1] American Cyanamid Co., research laboratories, Stamford, Conn.
[2] Bibliography references appear at end of article.

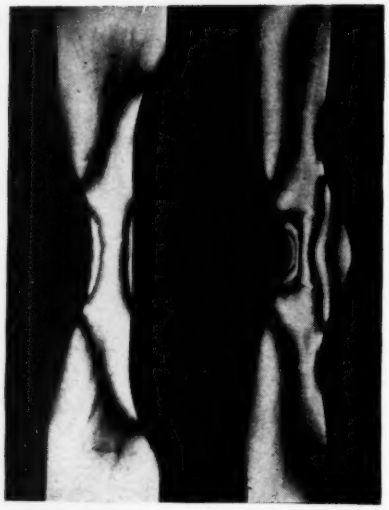


Fig. 2. Stress Distribution Patterns as Revealed in Polarized Light; (Left) Crescent Type Specimen; (Right) Angle Type

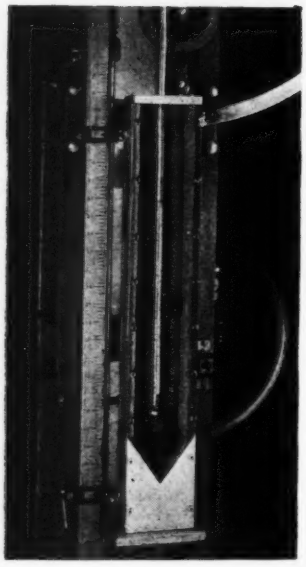


Fig. 3. Oven Equipment for Use with Scott Tensile Machine

distributed throughout the piece while only a small part is concentrated at the point of tearing.

Because of this distribution of the pulling force, the value obtained at failure is largely a modulus measurement. The tensional stress reaches its maximum when the tearing stress is attained at the apex of the cut and a pseudo evaluation of tear resistance is obtained. Under these conditions one would expect a marked relation between the ultimate elongation and the tear values obtained. The data appear to bear this out.

Figure 1 also illustrates the specimen designed to meet the requirement suggested above. The crescent test section is replaced by a 90-degree angle section. The tearing stress is concentrated at the apex of the angle eliminating the need of further nicking. This has resulted in a threefold improvement in uniformity of data over that obtained with the nicked crescent specimen. In the new specimen the point of tearing has been moved from the center line of pull between the boundary lines of the crescent piece to the boundary line of the angle test piece (See Figure 1), increasing the stress gradient. The result is a tear specimen in which the stress at the point of tearing exerts the dominant influence on the value obtained.

The stress distribution patterns of the two specimens are illustrated in Figure 2 photographed by means of polarized light. The test pieces were cut from a transparent *Hevea* rubber stock, and each was subjected to a pulling force of one pound. These patterns illustrate how much more effectively the pulling force is concentrated at the point of tearing in the angle specimen.

Experimental Details

In the following data the two specimens are compared in test compounds of four different elastomers. A study was made of the effect of heat aging (Geer oven at 100° C.) on tests at 25° C. In addition the effect of test temperatures on unaged stocks was determined. The compounds were cured and tested following A.S.T.M. procedure except that the tear test pieces were cut with the grain direction running across the specimen so that tearing would be with the grain.

Carpenter and Sargisson (3) tested seven different compounds of *Hevea* rubber employing 1,400 test pieces and found that with the crescent specimen tearing always followed the grain regardless of its direction in the test piece. Preliminary tests in this work indicated this characteristic of natural rubber with both specimens. In the synthetic elastomer stocks the effect of grain is not so pronounced, and tearing can be effected across the grain with both specimens. However a slight tendency toward lower tear resistance with the grain was observed.

Some investigators take steps in their mixing and curing procedures to eliminate grain effects. Since this is not a practice followed in commercial processing, it seems unwarranted in the laboratory. If grain from mills and calenders may be present in articles of commerce, and the tendency for tearing is in this direction, it seems sound practice to evaluate resistance in this direction in the laboratory. All values given in this paper represent tearing with the grain and are averages obtained from five specimens in each test.

The oven devised to adapt a Scott tensile machine to testing modulus, tensile, and tear resistance at elevated temperatures is shown in Figure 3. A combination of coil heaters and forced circulation of air insures uniform temperature throughout the test. The oven travels downward with the driven jaw, and elongation is observed through the transparent front. When disconnected from the base, the oven is readily raised and locked by the clamp at the lower guide. In this way free access is had to the jaws for specimen mounting. When the oven is again closed, three minutes are allowed to attain temperature equilibrium. Current to the coils is through a standard Variac for temperture control.

TABLE 1

Formulation	*Hevea*	GR-S	Neoprene	Hycar
Smoked sheets	100			
Buna S (GR-S)		100		
Neoprene GN			100	
Hycar OR-15				100
MPC black				50
EPC black	50	50	37	
Zinc oxide	5	5	1	5
Sulphur	3	2		1.25
Stearic acid	3		.5	1
Altax				.8
Captax	.8			
Aero Ac 50	.15			.15
Aero Ac 165		1		
Latac			.5	
L. C. magnesia			4	
AgeRite powder	1.25		2	
Pine tar	2			
Dibutyl phthalate				25
Bardol		5		
Temperature of cure—° C.	141	141	141	153
Minutes (optimum cure)	30	60	30	30

The formulation and optimum cures of the test compounds are given in Table 1. The physical data are found in Table 2. The marked improvement in uniformity of

test data obtained with the angle specimen is shown in Table 3. The data of Table 2 are plotted in Figures 4 to 7 to show the per cent. change in these properties from the values obtained for the original stocks tested at 25° C.

Before discussing the data reference is again made to the work of Busse (2). In defining tearing he further observed that in an iso-tropic material, tearing begins when the stress and strain at the point of tearing reach the tensile strength and ultimate elongation of the material. He then showed that in *Hevea* the tendency to fiber under stress results in a reenforcement of the rubber in the direction of the principal stress, and the force required to cause tearing is not readily correlated with tensile strength. In a synthetic elastomer such as GR-S there is no fibering under stress, and the evaluation of tear resistance becomes somewhat less complex.

Discussion of Test Data

HEVEA STOCK (FIGURE 4). Referring to Table 2, the value for the original stock is found to be some 37% higher with the crescent specimen than with the angle specimen. Since the crescent specimen has 25% less minimum cross-sectional area, it is apparent that the piece is in a higher state of general stress when tearing is effected. Since fibering is highly advanced, the influence of modulus on the tear value becomes very marked.

The crescent specimen indicated that with oven aging (increased modulus) the degradation of tear resistance was *less* than when the original stocks were tested at elevated temperatures (decreased modulus). The angle specimen indicated that with oven aging (greater tensile drop) the degradation of tear resistance was *greater* than with tests at elevated temperature (smaller tensile drop).

An interesting example of the excessive influence of stresses not involved in tearing can be found in the value obtained with the crescent specimen after 24 hours' oven aging. An increase of 6% was indicated while the angle specimen indicated a drop of 35%. This trend was observed in earlier work.

GR-S (FIGURE 5). As there is no tendency to fiber under stress in GR-S, a clearer picture of the factors influencing tear resistance can be drawn. The crescent specimen indicated that with oven aging (greater drop

TABLE 2

Effect of Oven Aging at 100° C. on Values Obtained at 25° C.

Stock Tested	Hours at 100° C.	At 200% Elongation (Lbs. per Sq. In.)	Tensile (Lbs. per Sq. In.)	% Elongation at Break	Crescent Tear (Lbs. per 0.1-In. Thickness)	Angle Tear (Lbs. per 0.1-In. Thickness)	Std. Dev.	Std. Dev.
Hevea ..	0	1080	4400	570	65.3	6.3	47.5	2.2
	24	1400	3850	470	69.5	3.5	31.0	1.4
	48	1400	2775	360	47.7	5.6	24.1	.9
	72	1400	2000	260	37.8	3.9	17.3	.2
GR-S ...	0	835	3100	580	29.4	3.3	22.8	.3
	24	1150	2900	390	24.9	3.1	21.7	.4
	48	1350	2700	320	23.5	3.1	20.1	.6
	72	1500	2600	290	20.1	1.6	18.7	.4
Neoprene.	0	1550	3700	450	45.5	5.1	32.9	1.2
	24	1900	3600	345	37.4	2.9	29.1	1.5
	48	2100	3400	310	31.7	1.3	28.5	.9
	72	2100	3400	300	31.0	3.0	26.5	1.3
Hycar ..	0	995	3800	540	22.7	1.0	20.6	.3
	24	1275	4425	435	23.4	2.9	21.1	.5
	48	1625	4325	380	27.9	1.7	23.3	.3
	72	1950	4250	340	24.5	1.5	22.6	.4

Effect of Test Temperature on Original Stocks

Stock Tested	Test Temp. ° C.	At 200% Elongation (Lbs. per Sq. In.)	Tensile (Lbs. per Sq. In.)	% Elongation at Break	Crescent Tear (Lbs. per 0.1-In. Thickness)	Std. Dev.	Angle Tear (Lbs. per 0.1-In. Thickness)	Std. Dev.
Hevea ..	25	1080	4400	570	65.3	6.3	47.5	2.2
	50	1020	3770	600	46.7	3.7	39.9	1.1
	75	880	3360	670	40.7	1.2	38.4	.8
	100	750	2610	650	31.8	.5	35.5	.5
GR-S ...	25	835	3100	580	29.4	3.3	22.8	.3
	50	750	2260	480	27.8	2.2	19.2	.2
	75	650	1500	380	25.5	1.8	16.0	.5
	100	650	1060	320	23.0	.8	14.9	.5
Neoprene.	25	1550	3700	450	45.5	5.1	32.9	1.2
	50	1340	2660	390	38.3	2.1	23.3	.2
	75	1140	1720	290	31.8	2.0	18.6	.2
	100	1080	1420	250	25.5	.7	13.5	.4
Hycar ..	25	995	3800	540	22.7	1.0	20.6	.3
	50	875	2700	460	19.5	1.8	17.5	.1
	75	830	1470	300	18.2	.9	13.5	.2
	100	820	1130	240	16.5	.6	9.0	.2

Std. Dev. = Standard deviation from mean of five specimens.

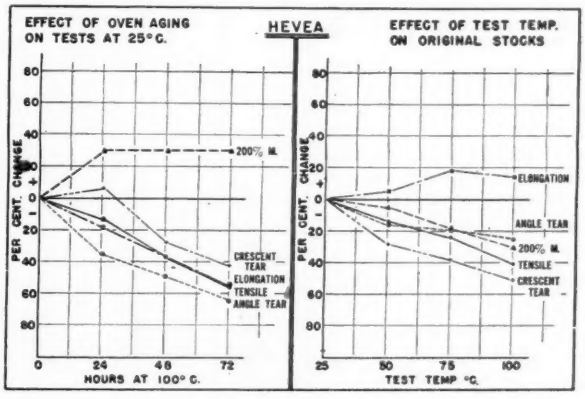


Fig. 4.

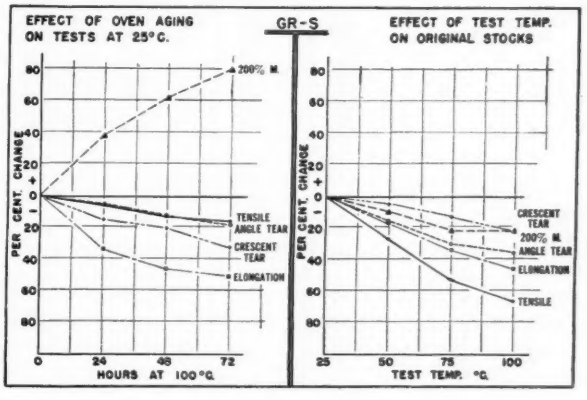


Fig. 5

TABLE 3. COEFFICIENT OF VARIATION OR STANDARD DEVIATION IN %

Investigation	Test	Crescent Tear Specimen: *Hevea*	GR-S	Neoprene	Hycar	Angle Tear Specimen: *Hevea*	GR-S	Neoprene	Hycar
Effect of oven aging at 100° C. on tests at 25°	Original	9	11	11	5	5	1	4	2
	24 hours	5	12	8	12	5	2	5	2
	48 hours	12	13	4	6	4	3	3	1
	72 hours	10	8	10	6	1	2	5	2
Effect of test temperature on original stocks	50° C.	8	8	5	9	3	1	1	1
	75° C.	3	7	6	5	2	3	1	2
	100° C.	2	4	3	4	1	3	3	2
Average	7 tests	7	9	7	7	3	2	3	2
Overall variability			7%				2%		

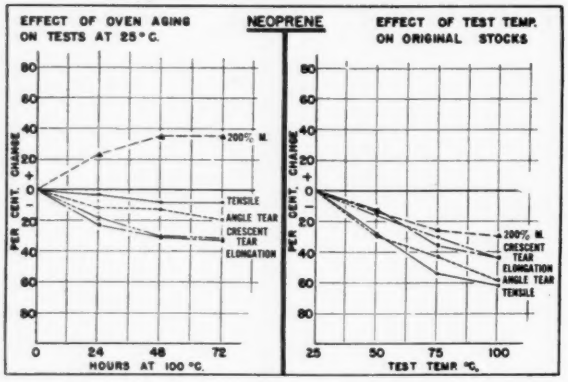


Fig. 6

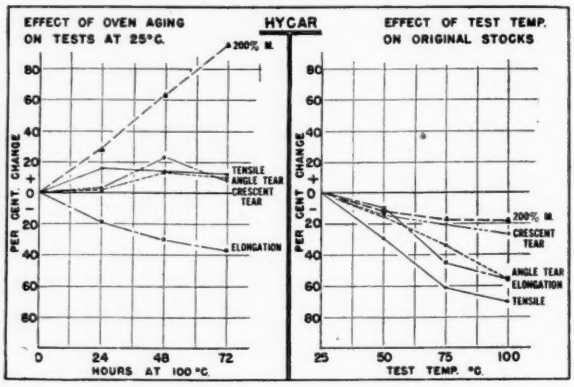
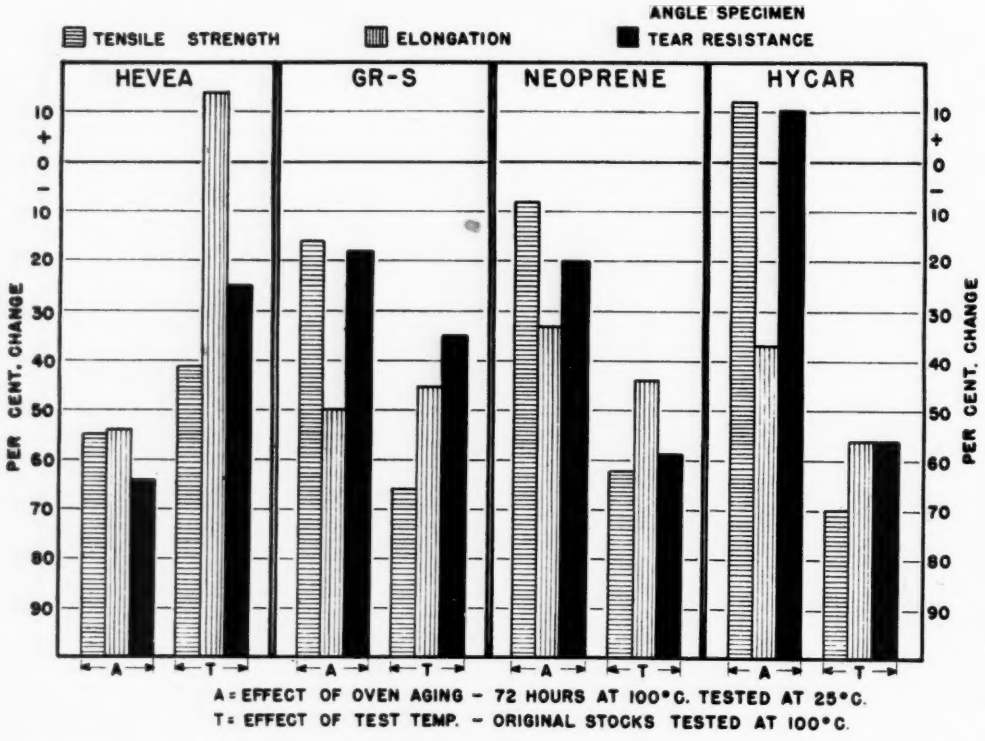


Fig. 7

Fig. 8



in elongation) the degradation of tear resistance was *greater* than when the original stocks were tested at elevated temperatures (smaller drop in elongation). The angle specimen indicated that with oven aging (smaller tensile drop) the degradation of tear resistance was *less* than with tests at elevated temperatures (greater tensile drop).

NEOPRENE (FIGURE 6). The influence of elongation on the crescent tear values and of tensile strength on angle tear values is at once apparent. When test conditions cause elongation to drop more than tensile strength, the crescent values drop more than the angle values and *vice versa.*

HYCAR (FIGURE 7). In this compound the effect of oven aging on physical properties is complicated by the presence of a fugitive plasticizer at 25% concentration. As the plasticizer is volatilized, there is an increase in tensile strength and tear resistance as reflected by both specimens. Apparently the dominating effect on tear resistance came from the combination of modulus increase and tensile increase.

Data on tests at elevated temperatures indicated again that with tensile strength dropping more than elongation angle tear values dropped more than crescent values.

The per cent. change in tensile strength, elongation, and tear resistance, as evaluated by the angle specimen, is recapitulated in bar chart form in Figure 8. The synthetic elastomers tested show less degradation of tensile strength and tear resistance than *Hevea* rubber with oven aging at 100° C. In tests on the original stocks at elevated temperatures, however, *Hevea* is outstanding in its retention of these properties. Tensile strength dropped less than tear resistance with oven aging at 100° C., while in tests at elevated temperatures the effect is reversed. This may very well illustrate the influence of elongation on tear resistance since in tests at elevated temperatures drop in elongation is considerably less than drop in tensile strength.

Of the four elastomers tested *Hevea* was unique in that

(*Continued on page 317*)

The Role of Organic Peroxides in the Processing of Rubber—I

Warren B. Warden[1]

THE tremendous catalytic activity of oxygen in rubber has been recognized for some time. In 1920, Porritt (1)[2] stated that "next to sulphur, oxygen is probably the most important rubber catalyst, and its effects must be carefully considered at all stages from the photosynthesis of rubber in the latex to the final transformation of rubber into a manufactured product." Conant and Peterson (2) have determined that, at the threshold of activity, one molecule of oxygen will start polymerization in 200,000 molecules of butyraldehyde. It has also been demonstrated that very minute quantities of oxygen have profound effects on the physical properties of crude rubber (3-6); according to Fry and Porritt (7) a proportion of oxygen of 0.0002 will decrease the viscosity by one half.

This catalytic activity of oxygen has only recently been purposely harnessed to perform a useful function in the processing of rubber. The primary concern in the past has been to find ways to inhibit the deleterious effects of oxygen on aging properties. The advent of the new synthetic rubbers, together with a better understanding of the mechanism of autooxidation and the development of more effective antioxidants, has created a renewed interest in the commercial application of organic peroxides in the rubber industry.

The object of this article is to point out some of the possible practical applications and to discuss various aspects of the use of organic peroxides in the vulcanization, plasticization, oxido-softening, and reclaiming of rubber. The pertinent information in the literature relative to the use of peroxides in the processing of rubber is summarized and grouped. The mechanism of the oxido-softening or fluidification of rubber is discussed, and a new thought suggested as a contributing factor in this mechanism. Included are some technical data on a new commercial organic peroxide and an illustration of its use in the curing of one of the new synthetic rubber-like materials. Only applications relative to the processing of rubber and rubber-like materials are included.

Effect of Peroxides on the Aging of Rubber

It has been well established that any residual peroxide left in the finished product will have a deleterious effect on the aging of natural rubber (8-10). This probably represents the primary reason why more useful advantage has not been taken of the catalytic activity of the organic peroxides in the past. Dufraisse (11-12) has written an excellent review on autooxidation in rubber, and the Research Association of British Rubber Manufacturers (13) has prepared an extensive bibliography.

It is postulated, however, that organic peroxides may be safely employed in processing rubber, if they are totally used up or destroyed in the process. Only the residual or unused portion can contribute to the deterioration by aging. The literature has failed to reveal any conclusive evidence to the contrary. On the other hand there is ample support to the contention that much of the taboo regarding the use of organic peroxides in the rubber industry has resulted from improper handling, questionable technique, excessive quantities and failure to destroy the residual excess.

Various investigators (14-16) have cited the very poor aging qualities of vulcanizates made with about 6 per cent trinitrobenzene. Yet Ostromislensky (17) obtained vulcanizates with trinitrobenzene, using suitable quantities and conditions, which were considerably more durable in use as well as in storage than regular sulphur vulcanizates. Just as over- or under-sulphur vulcanized rubber will deteriorate more rapidly than when properly vulcanized, so will materials improperly processed with organic peroxides yield inferior products. But, when properly used, the peroxides can serve a very worthwhile and useful function.

Two methods are available for destroying the residual peroxide in rubber—heat and chemical decomposition. Destruction of the peroxides by heat naturally results in a slight deterioration of the rubber; however, after the first period of heating, deterioration practically stops because in the absence of the peroxide catalysts the rubber alone no longer has the capacity for continued transformation. In this connection it is interesting to recall that cold vulcanizates absorb oxygen more slowly, but deteriorate more rapidly upon aging than do hot vulcanizates.

The exact temperature and time necessary to destroy the complex mixture of natural rubber peroxides formed during milling have not been determined although it is suspected that a high temperature is necessary for complete removal. On the other hand the decomposition temperature of the added peroxide can be accurately determined and the time required at that temperature for complete destruction can be closely estimated. The decomposition temperatures of three organic peroxides which bracket the practical working temperature range are given in Table 1. In general the use of aliphatic acid peroxides having less than 12 carbon atoms (lauric) in the parent acid is not practical because of inherent instability.

TABLE 1. DECOMPOSITION TEMPERATURES OF COMMERCIAL ORGANIC PEROXIDES

Peroxide	Chemical Formula	Molecular Weight	Decomposition Temperature ° F.
Lauroyl	$(C_{11}H_{23}CO)_2O_2$	398.4	130-133*
Stearyl	$(C_{17}H_{35}CO)_2O_2$	566.5	172-176†
Benzoyl	$(C_6H_5CO)_2O_2$	242.1	217-221*

* Data from technical bulletin of the Lucidol Corp., Buffalo, N. Y.
† Data from Royce Chemical Co., Carlton Hill, N. J.

The destruction of the residual peroxide by chemical means will depend on the peroxide used and the application. Fatty acid peroxides are unstable in the presence of alkaline materials. In aqueous solution they decompose rapidly at a pH of 9-9.5 at room temperature. In rubber compounding various suitable decomposition catalysts are known, but their activity is selective; i.e., aniline increases the reaction coefficient (k) of both ethyl and benzoyl peroxide as much as tenfold; whereas benzalde-

[1] Chemical engineer, Bradford, Pa.
[2] Bibliography references appear at end of this article.

hyde increases k of benzoyl peroxide, but not ethyl peroxide (18). Certain organometallic compounds are effective, but their use is not recommended unless thoroughly investigated as to other possible catalytic action.

Thus, to avoid harmful after-effects on aging properties, good technique in the use of organic peroxides as catalysts in the processing of rubber requires: (1) the use of the minimum quantity which will accomplish the desired purpose and (2) the choice of an organic peroxide which can be completely destroyed at the temperature and times required for subsequent processing (usually curing) before the rubber goes to storage as a finished product.

This discussion refers primarily to the effects of organic peroxides on the aging of natural rubber. Little can be said in a general way regarding their effects on the aging of the synthetic rubbers since each presents its own problems. In certain cases (Butyl, Paracon, etc.) deterioration by autooxidation is not a serious factor, and organic peroxides can be used without limitations in processing these materials.

Commercial Organic Peroxides

A second factor which has in the past restricted the practical application of organic peroxides in the processing of rubber has been the lack of suitable commercially available materials. Most of the published work has concerned the use of benzoyl peroxide, but there are several objectionable features inherent to its use for many applications. Under certain conditions it has a tendency to become irritating to the skin, and some painful dermic conditions have come to the writer's attention. Benzoyl peroxide in the pure state must be handled with precaution as it is subject to explosion owing to friction or dropping. Even commercial grades explode rather violently when ignited. Benzoyl peroxide is usually diluted with certain salts carrying a high degree of water of hydration to be more or less safely handled or compounded. When used in rubber, some of the benzoic acid residue combines with the rubber molecule, giving a hard, insoluble, easily pulverized derivative, which is probably the benzoic ester of polyhydroxyisoprene (19). In addition, some of the benzoic acid sweats to the surface of the rubber, forming a "glassy" bloom identified as free benzoic acid (20).

Stearyl peroxide would, however, seem to overcome all the obvious disadvantages of the more common benzoyl peroxide. Through a recent development it is expected that stearyl peroxide will soon be available commercially. Practical experimental quantities (up to about 10 pounds) can now be obtained.[3] The whole series of fatty acid peroxides could be made available if sufficient demand existed. In fact stearyl peroxide, as now manufactured, is made from commercial stearic acid, which contains appreciable quantities of palmitic acid.

Stearyl peroxide is a white powder which can be added to rubber directly on the mill. While exhaustive controlled tests have not been conducted, the dry peroxide has been handled safely without precautions in many experiments. Rigorous mixing of the dry powder in a steel mortar with a heavy steel pestle has been done repeatedly without effect. When heated in an open flame, the stearyl peroxide first melts, then ignites, and burns rather meekly. It is relatively stable at room temperature; a sample of 70% theoretical strength material loses approximately 0.028% oxygen in a period of three months. It is insoluble, but readily dispersed in water and may be dissolved completely in petroleum naphtha and isopropyl alcohol; it is mostly soluble in carbon tetrachloride and is partly soluble in acetone.

Regarding tendency for skin irritation, the writer has worn patches of both dry and dampened stearyl peroxide directly against the skin for seven consecutive days without effect. Control tests on benzoyl peroxide showed small bright red spots on the skin after the second day.

The per cent. by weight of available oxygen is relatively lower in stearyl peroxide owing to the high molecular weight of the parent hydrocarbon. The molecular weight of pure stearyl peroxide is 566.5, of which one mole of oxygen is available as nascent oxygen. Thus the maximum theoretical available oxygen is $\frac{16 \times 100}{566.5}$, or 2.82%. This corresponds to a theoretical available oxygen of 6.61% for benzoyl peroxide. The present cost of stearyl peroxide during the development stage is less than one half that of benzoyl peroxide, and the anticipated after-the-war price will be about one-fifth. Thus the relative cost based on available oxygen is now nearly comparable, and, when production gets started, stearyl peroxide should be decidedly cheaper. More important, however, is the fact that the decomposition residue of stearyl peroxide is principally stearic acid, which in itself is a valuable and much used compoundng ingredient in most rubber formulations. Further, there are indications from other experimental work that for certain applications stearyl peroxide is more effective as a catalyst, requiring less than is indicated by the ratio of available oxygen. The thought has been expressed that "free radicals" might have an important influence on some of these reactions.

Other available organic peroxides might be mentioned, such as pelargonyl peroxide, tertiary butyl hydroperoxide, caprylyl peroxide, lauroyl peroxide, etc. A detailed discussion of these materials is beyond the scope of this paper. The object here has been to compare some of the points regarding that particular new organic peroxide which seems best suited for applications involving rubber with the older and more common benzoyl peroxide. The commercial availability of stearyl peroxide and its obvious advantages should be of considerable interest to the rubber industry.

Vulcanization of Natural Rubber

Oxido-vulcanization of natural rubber has not, in general, been commercially successful, and there is little, if any, reason why it should be. Relative to regular sulphur vulcanization, oxido-vulcanization is more expensive, harder to control, and subject to undesirable after-effects for most ordinary uses. On the other hand there are certain exceptions and special cases wherein oxido-vulcanization is of value.

While complete vulcanization of natural rubber with peroxides alone has never, to the writer's knowledge, been entirely satisfactory, much interesting work has been done. It has been reported that vulcanizates have been made without sulphur which show no detectable differences when fresh (9, 14, 21, 22). However the rubber products obtained with various peroxides gradually deteriorate into sticky masses. Ostromislensky (17) has reported, however, that benzoyl peroxide vulcanizates can be stabilized with 0.2 to 1.0% sulphur.

Van Rossem, Dekker and Prawirodipoero (20) have reported some interesting work on this subject. They state that vulcanization with sulphur is rapidly accelerated by benzoyl peroxide. This statement raises the point that possibly the use of the proper amount of one of the organic peroxides as an accelerator for sulphur vulcanization might result in the improved resiliency, elongation,

[3] Royce Chemical Co.

and tensile strength characteristic of partial peroxide vulcanization. The only precaution here is to choose a peroxide which would be destroyed at the time and temperature of the sulphur vulcanization.

In the field of adhesive compositions the vulcanization of rubber with non-sulphur-containing chemicals has reflected some interest, especially in the patent literature. Typical of these is a 1941 British patent (23) in which a non-sulphur-containing chemical, which possesses the properties of both an oxidizing agent and a vulcanizing agent for ordinary rubber, is added to a rubber-isomer adhesive. Among these vulcanizing agents are the quinoneimines, halogenated quinones, polynitroaryl compounds, and aromatic acyl peroxides. An inorganic oxidizing agent such as lead chromate, lead dioxide, or mercuric oxide may be added to effect better vulcanization.

The organic peroxides also find application in the manufacture of sponge rubber. Their use has been patented as a gasifying agent to promote pore formation in the rubber (24). A recent patent (25) involving a combination oxido- and sulphur vulcanization is of interest. Here a vulcanizable rubber compound is gas-expanded and partially cured by an active non-sulphur vulcanizing agent from the class including organic acid peroxides and then subsequently is given a final cure primarily with sulphur at a higher temperature.

Curing of Synthetic Rubber-Like Materials

The processing of some of the new synthetic materials presents a wide and varied field for the application of organic peroxides. For the most part, however, much of the detail regarding the newer rubber-like materials has not as yet been published, and some of the information is of a restricted nature because of war contingencies. This precludes any attempt at a complete coverage of the possible applications for the organic peroxides in this field at the present time. Some preliminary data are presented, however, which indicate a few of the potentialities.

TABLE 2. CURING OF PARAPLEX X-100 WITH BENZOYL AND STEARYL PEROXIDES

Formulation:	A	B
Paraplex X-100	100	100
Luperco A	2.15	..
Stearyl peroxide (50%)	..	3.0
Paraffin wax	1	1
Kalvan	79	79
Physical Properties:		
Milling and handling	Mills easily	Mills easily
Optimum cure	10 min. @ 260° F.	10 min. @ 260° F.
Tensile strength	1775#/sq. in.	1750#/sq. in.
Elongation	410%	475%
14-day aging, Geer oven (158° F.):		
Tensile strength	2% decrease	No change
Elongation	No change	No change
Abrasion resistance (du Pont)	210 cc./hp. hr. loss	207 cc./hp. hr. loss
Low Temp. flexing, flexible at:	—50° F.	—50° F.
Tear resistance	Poor	Poor
Permanent set	10%	10%
Resilience (Lupke)	58%	59%

ALKYD RESIN TYPE. Paraplex X-100 is one of the very promising new rubber-like synthetics. This resin was developed by Bell Telephone Laboratories under the name "Paracon." It has been cured with the recommended 2.15 parts of Luperco A, (a 23% dispersion of benzoyl peroxide in an inert filler), in comparison with 3.0 parts of stearyl peroxide. The particular sample of stearyl peroxide used for this experiment contained 50% of the theoretical available oxygen; the residue is stearic acid. Since these experiments were conducted much higher strength material has become available, which probably would reduce the amount of stearyl peroxide required. Optimum cure in each case was obtained in 10 minutes at 260° F. The results are presented in Table 2. It will be noticed that the physical properties are essentially the same, except that the stearyl peroxide gave a slight improvement in elongation. While the tear resistance relative to natural rubber was poor in each case, it was comparable to most of the synthetics. These data illustrate that it is feasible to use stearyl peroxide in place of benzoyl peroxide and thus take advantage of the cost and safety advantages previously discussed.

CHLOROPRENE TYPE. While it is well known that chloroprene will polymerize with mere traces of oxygen from the air, there are patents wherein chloroprene is used as an impregnating material for fabrics in which the curing takes place *in situ* and is catalyzed by organic peroxides. One such patent (26) claims that chloroprene (50 parts), benzene (50 parts), turpentine (one part), and benzoyl peroxide (one part) are used as an impregnating material which will cure at room temperature.

BUTADIENE TYPE. Similarly the polymerization of polybutadiene in emulsion form by means of peroxides (27) might be considered curing in certain cases, although in general the application of peroxides in the butadiene synthetics is in the manufacturing end as polymerization catalysts.

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Aromatic Hydrocarbon Compounding Materials for GR-S

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THE choice of softeners in the compounding of GR-S remains one of the problems presenting difficulties and perplexing alternatives to the compounder. Even in what now appear to have been the comparatively simpler problems of compounding natural rubber, the selection of plasticizers and softeners was a test of the skill of the rubber chemist. The many functions of a natural rubber softening agent involve a balance among supplying deficiencies of natural acids, its effectiveness as a dispersing medium and its ability to keep down heat when milled with relatively large quantities of dry pigments, and its contribution toward increased service and durability.

With GR-S the problem remains the same in type although GR-S embodies some very fundamental differences in physical properties and chemical reactions. This has necessarily meant the scrapping of previous formulations, with new sets of values to be determined by research and experimentation to achieve the results formerly obtained in compounding natural rubber.

The purpose of this paper is to present in a comparative sense the results of compounding GR-S with the various classes of aromatic hydrocarbon materials commercially available. It seeks to compare the properties of various classes of softeners and to discuss several significant aspects of this study. A further object is to show how the basic deficiencies of GR-S can be minimized by certain compounding techniques using the aromatic hydrocarbon softeners. The preparation of these data was undertaken in the hope that it might serve as a reference to the compounder who does not possess the facilities to compile and chart the considerable research data involved. Numerous tabulations are used, both in regard to aromatic hydrocarbon softeners in classes and as specific types.

The aromatic hydrocarbons, largely derived from the thermal decomposition of bituminous coal or oil, are as a group useful in improving the physical properties of GR-S. The following WPB standard test recipe for tire tread stock, effective September 1, 1942, offers an example. Whereas superior results may be obtained under certain conditions with other types or quantities of softeners, this formula was based on a mean between desirable physical properties and availability of materials. It is marked 1-3, being the recipe on which references to tire stock in Table 3 are based.

[1] Director of research, Neville Co., Pittsburgh, Pa.

TABLE 1-3

GR-S	100
EPC Black	50
Class I coal-tar distillate softener	5
Zinc oxide	5
Sulphur	2
Mercaptobenzothiazole	1.5

TABLE 3

Class of Softener	Filler	Release	Use
I	Carbon black	314-4	Tread stock
II	Carbon black	315-1	Belt cover
I	Carbon black	315-2	Belt cover
I	Carbon black	315-2	Belt cover
I	Carbon black	315-4	Belt cover
II	Carbon black	315-5	Belt friction
II	Carbon black	315-7	Belt friction
II	Carbon black	315-8	Belt friction
II	Carbon black	315-9	Belt friction
II	Carbon black	315-9	V-belt Friction stock
III	Carbon black	315-10	Fire hose Tube
II	Carbon black	315-11	Fire hose Tube
III	Carbon black	315-12	Steam hose
III	Carbon black	315-14	Braided air hose Tube and cover
III	Carbon black	315-16	Radiator hose Tube and cover
III	Carbon black	315-16	Radiator hose, friction
II	Carbon black	315-18	Extruded shapes
III } I }	Carbon black	315-19	Molded goods
III	Carbon black and zinc oxide	315-21	Roll coverings
II	Black and inert	315-22	Tank lining
III	Zinc oxide and clay	415-11	Wire and cable insulation, neutral color
II	Zinc oxide and carbon black	415-13	Heavy-duty jacket insulation
I	Clay	911-3	Hard rubber*
II	Carbon black	911-3	Hard rubber*
II	Carbon black	911-3a	Hard rubber*
I	Clay	911-3a	Hard rubber*
II	Carbon black	911-6b	Hard rubber*
II	None	911-7	Hard rubber*
I	Carbon black	215	Tire tread
I	Carbon black and magnesia	215	Tire tread
I	Carbon black	215-2	Ply stock

* For hard rubber compounding, references may be made to Releases 911-8 and 911-9. In such compounding, R-29, 25° C. melting point Neville resin, gives the lowest plasticity, and certain Class I softeners give the highest plasticity. Class I softener gives the best tackiness. For tensile strength of hard rubber refer to Release 911-10. Depending on type of cure method, highest tensiles are obtained as follows, using:

Class I and II softener.....Soapstone cure in steam
Class II softener.....Air cure
Class III softener.....Sheet cure in water between tin

Classes of Softeners

For the purpose of evaluating the functions of the various softeners, they are best divided into the three following classes:

TABLE 2

Material	Class	Average Sp. Gr. @ 15.6°/15.6° C.	Lbs. per Gal.	Color	Distillation Range ° C.
X-1 Resinous Oil	I	1.08	9.00	Dark brown	180-300*
Nevoll, Bardol	I	1.10	9.17	Brown-black	200-355*
R.S No. 2 Softener, dipolymer oil	I	1.07	8.92	Amber	170-355
R.S. No. 3 Softener, Piccocizer 30	I	1.00	8.33	Brown	200-300
R.S. No. 5 Softener	I	0.96	8.00	Pale amber	200-300
R.S. No. 9 Softener	II	1.09	9 08	Pale amber	Above 300*
R.S. No. 11 Softener	II	0.99	8.25	Amber	Above 300*
R.S. No. 14 Softener, Bardex	II	1.12	9.33	Black-brown	200-355
R.S. No. 15 Softener, BRV	II	1.15	9.58	Brown-black	Above 300
R-29 Neville Resin, 10°, Cumar P-10	II	1.10	9.17	Pale amber	Above 300*
R-29 Neville, Resin, 25°, Cumar P-25	II	1.10	9.17	Pale amber	Above 300*
Neville coal tar, BRT No. 7	II	1.18	9.83	Black-brown	200-355
R-17 Neville Resin, Cumar RH	III	1.12	9.33	Amber	Non-volatile
R-16 Neville Resin, Cumar MH-2½	III	1.16	9.62	Amber	Non-volatile
Paradene No. 1, Cumar DX	III	1.10	9.17	Dark brown	Non-volatile
Paradene No. 2, Cumar EX	III	1.16	9.62	Dark brown	Non-volatile
Coal-tar pitch, Carbonex	III	1.24	10.33	Black-brown	Non-volatile

* Not completely volatile.

I. Liquids—coal-tar distillates; alkylnapthalene and polynuclear benzenes.

II. Semi-solids—coal tar; low molecular weight polymers of coumarone-indene and related-type resins.

III. Solids—coal-tar pitch; medium hard and hard coumarone-indene resins.

The essential properties of the materials in these classes are defined in Table 2.

Classes of Softeners for Various Types of Stocks

The aromatic hydrocarbon softeners of the three classes mentioned above vary in physical properties to such an extent that their versatility in compounding GR-S allows their use in stocks having a wide range of characteristics and uses.

Releases from the Office of Rubber Director [now Rubber Bureau, WPB], available to all qualified manufacturers, contain a body of information essential to the compounder of GR-S. This includes the setting forth of the rather wide special uses of aromatic hydrocarbons compounded in GR-S in providing numerous types of stocks, among them, tire tread, belt cover, belt friction, V-belt, friction stock, coat stock, air, radiator, fire, and steam hose, and various mechanical goods. Releases have

TABLE 4

Softener	Incorporation Time in Minutes	Mill Temperature ° F.	Minutes Cure at 280° F.	300% Modulus	Ultimate Tensile P.S.I.	Ultimate Elongation %	Shore Hardness	Rebound†	% Set	Heat Loss %‡	Freeing Temperature ° C.§	Shore Hardness after Heat Loss
Class I			30	440	1630	770	60					
			45	750	2470	670	63	63	36.3	4.55	—43	96
X-1 Resinous Oil....	10	154-146	60	870	2400	600	65	63	32.8	4.68	—43	96
			75	960	2600	595	65	64	28.5	4.69	—43	95
			90	970	2700	593	65					
			30	840	2480	627	62					
			45	1120	2600	540	65	63	26.0	4.90	—43	90
Nevoll	10	154-147	60	1200	2500	510	65	63	19.7	4.63	—43	90
			75	1260	2530	490	65	63	16.5	4.64	—42	94
			90	1300	2460	457	65					
			30	650	2500	720	60					
			45	830	2570	623	62	64	25.7	6.85	—39	95
R.S. No. 2.....	12	148-135	60	940	2600	600	62	63	25.4	7.32	—38	98
			75	920	2800	605	62	63	21.2	7.26	—38	92
			90	990	2450	573	62					
			30	640	1960	585	61					
			45	1000	2000	493	64	64	30.2	6.45	—38	90
R.S. No. 3.....	15	153-146	60	1100	2150	480	64	64	30.3	7.19	—38	95
			75	1100	2270	485	64	65	20.0	6.66	—37	95
			90	1140	2000	440	64					
			30	860	2400	630	61					
			45	1220	2470	495	64	65	35.7	6.72	—44	96
R.S. No. 5.....	15	155-143	60	1340	2100	403	64	65	17.4	6.73	—44	100
			75	1480	2400	430	64	66	15.6	6.60	—44	95
			90	1480	2470	435	64					
Class II												
			30	780	2220	613	61					
			45	1100	2370	500	65	62	34.1	5.44	—39	98
R.S. No. 9.....	12	156-148	60	1130	2550	495	65	63	18.8	5.32	—39	92
			75	1170	2520	495	65	62	15.4	4.97	—38	90
			90	1300	2330	423	65					
			30	820	2520	640	61					
			45	1100	2570	560	64	63	30.4	5.80	—44	89
R.S. No. 11.....	15	167-148	60	1130	2640	540	65	63	25.7	5.00	—44	90
			75	1140	2600	530	66	64	19.9	5.48	—43	95
			90	1200	2670	527	66					
			30	770	2770	700	65					
			45	980	3000	637	66	62	33.2	2.57	—43	90
R-29 Neville Resin, 25°	11	159-144	60	1080	2950	600	66	63	13.5	2.81	—43	92
			75	1060	2970	590	66	62	16.3	3.24	—43	95
			90	1090	2750	567	66					
Class III												
			30	780	2440	685	64					
			45	1050	2740	590	66	62	23.4	1.72	—38	95
Nevillac Resin, Hard	12	158-146	60	1190	2880	560	68	61	28.4	1.62	—38	92
			75	1170	2770	540	69	61	26.6	1.35	—38	82
			90	1230	2770	530	69					
			30	800	2620	663	64					
			45	1050	3260	635	65	61	33.0	1.64	—42	90
Paradene No. 1.....	7	172-159	60	1100	3040	583	66	61	34.6	1.57	—42	90
			75	1150	3100	575	66	62	20.8	1.56	—42	90
			90	1180	3120	575	66					
			30	520	1860	783	63					
			45	900	2700	637	67	61	29.0	2.13	—39	95
Paradene No. 2.....	7	156-149	60	1000	2640	580	68	62	37.2	1.95	—39	90
			75	1050	2720	577	69	62	30.6	1.95	—39	94
			90	1100	2680	553	70					
			30	260	1130	790	57			1.99		75
			45	680	2520	697	59			1.70	—45	77
R-16 Neville Resin..	11	.....	60	900	2820	640	62	66	37.5	1.43	—45	78
			75	980	2920	613	63	63	20.0	1.51	—45	80
			90	1070	2860	577	63	65	28.0	1.55		78
			30	700	2620	700	62					
			45	1030	2870	607	65	63	23.7	2.31	—39	92
R-17 Neville Resin..	5	161-143	60	1060	3020	600	65	62	26.0	2.32	—39	95
			75	1140	3240	597	65	62	17.0	1.70	—39	84
			90	1200	3140	563	65					

* Degrees F. High to Finish.

† Lupke rebound—% rebound first impact.

‡ Heat loss after 48 hours at 300° F. on cured stock.

§ Degrees C. by flexing tests made by immersing small looped samples in methanol and determining the temperature at which they lost flexibility. The operator makes this determination by sampling occasionally with a little pronged instrument.

also been made on extrusion materials, molded goods, roll coverings, tank linings, wire and cable insulation, and the like. For the convenience of the compounder the releases, by number, covering such major uses are listed in Table 3. The classes of aromatic softeners used are indicated.

Behavior of Synthetic Rubber Softeners

In cooperation with the rubber industry and rubber compounding laboratories, a behavior study of synthetic rubber softeners in the classes given with synthetic rubber GR-S has been completed and is here set forth.

With the thought that it would be of interest to the compounder, data are given on all softeners on which the study was undertaken, whether or not a current application occurs in the knowledge of the writer. Certain characteristics will have special values to some compounders; and having the complete data may be helpful as a guide when it is intended to use more than one softener.

The following recipe was used in all cases:

GR-S	100
Zinc oxide	3
Stearic acid	2
Santocure	1.5
Sulphur	1.75
EPC Black (W-6)	50
Neville softener	10

The results are given in Table 4, divided into three groups, listing the results with classes I, II, and III, respectively.

With reference to Table 4 (Class I), the processing properties of these materials on the mill varied considerably, but in general the higher melting point resins mix more uniformly and in a shorter time than the softer resins and oils. The Paradene resins and R-16 and R-17 Neville Resins (Class III) were outstanding in this respect. Two additional practical effects of using R-16 Neville Resin are apparent: good stability during high temperature service as evidenced by minimum increase in hardness, and low loss in weight after heat loss test. Experience has indicated that while the aromatic hydrocarbons do not impart the desired degree of tack to the compound on the mill, they are, nevertheless, satisfactory for industrial compounding applications.

Inorganic Acceleration

Inorganic acceleration in GR-S has been evaluated by another research laboratory[2], which found a combination of litharge and zinc oxide gave best results, using a Class I softener. Although the organic accelerated (control) cured the faster and gave the higher modulus, lower set, and higher tear resistance, the inorganic activated stock produced somewhat higher tensile and elongation at break. These data suggest a combination organic-inorganic activation to take advantage of the faster cure characteristic of the former and the greater stability of the latter. The best inorganic cured and control recipes and test data are given in Table 5.

TABLE 5

	Inorganic	Organic (Control)
GR-S	100	100
Sulphur	2	2
EPC black	50	50
Class I softener (Bardol)	5	5
PbO	5	..
ZnO	5	5
Stearic acid	..	1.0
Santocure	..	1.2
Optimum cure, time-min.	90	60
Temp. ° F.	287	280
Modulus 300%	840	1102
Tensile at break, P.S.I.	2376	2214
Elongation at break, %	552	465
Tear resistance*	314	422
Shore hardness	60	61

* Goodrich-Winkelmann test, results in #/0.1" thickness.

Factors Affecting Fatigue and Heat Tenderness

Two of the most evident deficiencies of GR-S are failure through fatigue and heat tenderness. Factors affecting these two properties have been studied and published by a large carbon black producer.[3] A theoretical approach has been taken concerning the size of polymer units which for GR-S (latex) are about one-twentieth the diameter of natural rubber (latex). In effect, then, either of two approaches can be taken, the use of superfine carbons or the use of a solvent-type softener to swell the GR-S polymer unit; the objective of which is to develop a carbon black/polymer unit size ratio in GR-S similar to that in natural rubber.

As the latter approach was the more expedient, it was tried with a Class I softener of the Bardol type. The conclusion based on experimental laboratory work was that "the maintenance of tensile and elongation, together with outstanding improvement in fatigue and heat tenderness, suggests that high dosage of colloidal carbon, properly balanced with a solvent softener, are capable of effecting improvement in GR-S."

Three such formulations with controls are illustrated:

	Control	A	B	Control	C
Class I softener	5	30	25	7.5	20
Micronex black	50	75	80	45	..
Statex black	..	..	..	..	80
Modulus (300%) p.s.i.	900	975	1300	865	1375
Tensile p.s.i.	2325	2425	2425	3050	2475
Elongation %	550	585	500	615	530

Medium-Hard Coumarone-Indene Resin with Non-Carbon Black Fillers

Of especial usefulness among the softeners tabulated, medium-hard coumarone-indene resin has been the subject of extensive research by several laboratories. This resin has been found to be particularly useful in the production of rubber goods with non-carbon black fillers, such as calcium carbonate, lithopone, and hydrated cal-

TABLE 6. EVALUATION OF CALCENE T IN GR-S—R-16 NEVILLE RESIN COMPOSITIONS

Recipe	Parts by Weight
GR-S (Goodyear)	100.0
Zinc oxide	5.0
Stearic acid	2.0
Sulphur	2.0
Thionex	0.35
Accelerator 808	0.15
R-16 Neville Resin	30.0
Calcene T	As indicated

I. Stock not Given Remilling

A. 30 Volume Loading

Cure Min./287° F.	Modulus 100%	Modulus 300%	Modulus 500%	Tensile	Elongation	% Permanent Set	Shore Hardness	Goodrich Tear, #/0.1"
15	113	199	440	1418	665	32	51	8
20	156	227	440	1531	670	34	51	8
30	113	199	440	1517	665	35	51	8
45	99	213	440	1305	645	33	51	8
B. 50 Volume Loading								
15	170	255	610	1801	675	51	59	15
20	170	255	624	1744	660	59	60	16
30	156	255	596	1631	645	54	60	15
45	142	213	610	1716	650	49	60	15
II. Stock Remilled after Cooling 24 Hours								
A. 30 Volume Loading								
15	113	184	369	1461	685	33	50	11
20	142	199	369	1446	675	30	50	9
30	113	199	397	1531	670	38	50	8
45	99	170	383	1489	665	35	50	8
B. 50 Volume Loading								
15	142	213	567	1730	675	52	59	14
20	142	227	567	1687	665	53	59	15
30	156	227	610	1758	660	58	59	13
45	142	227	610	1716	660	51	59	15

[2] Eagle-Picher Lead Co., Joplin, Mo. Private communication.

[3] "The Improvement of Thermal Shortening and Fatigue (Cut Growth) of GR-S Treads." Columbian Carbon Co., New York, N. Y., May, 1943.

TABLE 7. EVALUATION OF SILENE EF IN GR-S—R-16 NEVILLE RESIN COMPOSITIONS

Recipe

	Parts by Weight
GR-S (Naugatuck)	100.0
Zinc oxide	5.0
Stearic acid	2.0
Sulphur	2.0
Thionex	0.35
Accelerator 808	0.15
R-16 Neville Resin	As indicated
Pigment	As indicated

I. Stock not Given Remilling

A. 40 Volume Loading

Pigment	R-16	Cure Min./287° F.	Modulus 100%	Modulus 300%	Modulus 500%	Tensile	Elongation	% Permanent Set	Shore Hardness	Goodrich Tear, #/0.1"
Silene EF	20 parts	20	156	269	369	397	655	119	70	12
		45	213	510	851	1035	615	61	71	19
		60	255	596	1035	1219	595	62	73	21
		90	312	737	1319	1489	565	50	75	23

II. Stock Remilled after Cooling 24 Hours

A. 40 Volume Loading

Silene EF	20 parts	20	128	227	269	411	860	147	68	12
		45	199	411	794	1205	725	81	72	22
		60	227	510	964	1475	685	75	73	25
		90	284	638	1163	1702	650	62	75	27

TABLE 8. COMPARISON OF CUMAR MH-2½ AND R-16 NEVILLE RESIN IN GR-S COMPOSITIONS CONTAINING CALCENE T AND SILENE EF

Recipe

	Parts by Weight
GR-S (Goodyear)	100.0
Zinc oxide	5.0
Stearic acid	2.0
Sulphur	2.0
Thionex	0.35
Accelerator 808	0.15
Softener	As indicated
Pigment	As indicated

All Stocks Remilled after Cooling 24 Hours

A. 50 Volume Calcene T

Softener	Cure Min./287° F.	Modulus 100%	Modulus 300%	Modulus 500%	Tensile	Elongation	% Permanent Set	Shore Hardness	Goodrich Tear, #/0.1"
30 Parts Cumar MH-2½	15	170	241	553	1801	680	62	59	17
	20	156	241	581	1744	665	67	60	17
	30	156	255	567	1744	660	69	60	15
	45	142	213	567	1687	645	67	60	13
30 Parts R-16	15	142	213	567	1730	675	52	59	14
	20	142	227	567	1687	665	53	59	15
	30	156	227	610	1758	660	58	59	13
	45	142	227	610	1716	660	51	59	15

B. 40 Volume Silene EF

30 Parts Cumar MH-2½	20	142	298	539	837	785	94	69	17
	30	170	369	652	1049	735	78	70	19
	45	199	440	837	1219	660	63	71	22
30 Parts R-16	20	156	326	581	993	795	94	69	24
	30	199	411	780	1262	710	74	70	24
	45	227	510	936	1446	680	70	71	26

cium silicate. Because of its high tear resistance, medium-hard coumarone-indene resin has proved the optimum softener in neutral-colored rubbers where a black is not required, such as the production of wire and cable insulation. It has proved useful in hot-water-bottle stocks and the like. In common with other Class III softeners it is also applicable for hard rubber goods.

Because of this behavior of medium-hard coumarone-indene resin, a study conducted on it by the laboratory of a leading chemical manufacturer[4] is given in Tables 6, 7 and 8.

In this study GR-S, a medium-hard coumarone-indene resin (Neville R-16), and sulphur were mixed on a hot mill (170° F.) and thoroughly blended. This master-batch was then allowed to cool for 24 hours before the remaining compounding ingredients were added on a cool mill. In some cases the completely compounded stock was remilled. When this operation was completed, the stock was permitted to rest for 24 hours, then was remilled and cured; not more than four or five hours elapsed between remilling and curing. When the stock was not remilled, it was allowed to rest for 16 to 20 hours before being cured.

In Table 6 are listed the physical data obtained with Calcene T compositions.

In Table 7 are summarized the physical test data obtained with several Silene EF compositions. This laboratory concludes:

"It will be observed that in the Silene EF compositions R-16 Resin has a marked retarding action ,whereas in Calcene T compositions no appreciable retarding cure is encountered."

Additional reports on medium-hard coumarine-indene resin by the laboratory of another leading chemical manufacturer[5] throw further interesting light on the subject. They point out that only by the use of reenforcing non-black fillers, or, of course, carbon black, is it possible to exceed ultimate tensile values higher than 1,200 p.s.i. using GR-S. Tests with Cumar MH-2½, in this use interchangeable with R-16 Resin, gave tensile values of at least, 1,700 to 1,800 pounds in a GR-S compound loaded with non-reenforcing, non-black fillers. The medium-hard coumarone-indene increases elongation, provides exceptionally good tear resistance, and by its use affords the means for obtaining hardnesses as low as 40 with high ultimate tensiles.

[4] Columbia Chemical Division, Pittsburgh Plate Glass Co., Pittsburgh, Pa. Private communication.

[5] E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., Report Bl-121 (Sept. 30, 1943).

In the testing, Cumar MH-2½ and sulphur were added simultaneously to the GR-S on a mill heated to approximately 140° C. The Cumar MH-2½ was absorbed very readily, and no difficulties were experienced with the sticking of the batch to the rolls. After both materials were incorporated the batch was removed from the hot mill and finished on cool rolls. The compounds tested and physical data obtained are shown in Table 9.

Lithopone was selected as the filler for this study because it appears to be one of the poorest of the non-reenforcing fillers used in light-colored stocks—toward which class of compounds this work was directed.

TABLE 9

Base Stock

GR-S	100.0
Zinc oxide	10.0
Thionex	0.5
MBTS	0.5
Lithopone (50 vols.)	207.5
Sulphur	2.5

Variables

Compound Number		P.H.R.
1	Base stock as shown	
2	Base stock plus Cumar MH-2½	5.0
3	Base stock plus Cumar MH-2½	10.0
4	Base stock plus Cumar MH-2½	20.0
5	Base stock plus Cumar MH-2½	40.0
6	Base stock plus Naftolen R-100	20.0
7	Base stock plus Naftolen R-100 and Cumar MH	10.0 10.0

Cure: 15 minutes at 316° F.

Physical Data

Compound Number	Modulus 300% P.S.I.	Modulus 500%	Tensile Strength at Break P.S.I.	Elongation at Break %	Hardness (Shore Type A)
1	275	..	475	400	58
2	225	..	475	455	57
3	150	450	625	540	55
4	150	275	1525	715	49
5	75	150	1775	870	39
6	75	325	350	515	45
7	75	300	750	610	48

High loadings of zinc oxide in GR-S have yielded compounds which show improved physical properties when coumarone resin plasticizer is used. The optimum properties are obtained with a resin such as R-16 or R-12 resins, or Cumar MH-2½.[6]

Physical Properties as Affected by Molecular Weights

The rubber compounder has been confined for the most part to the use of one type of softener; the properties of the stock have been varied by other factors. Of the aromatic hydrocarbons, the coumarone-indene resins alone offer the possibility of varying the physical properties of the stock through the mechanism of molecular weight selectivity. This suggests a comparison of physical properties with respect to molecular weight.

It is interesting to note that the coumarone polymers between molecular weights of 232 and 600 are all hot solvents for GR-S. Consequently polymers having average molecular weights of respectively 240, 400, 450 and 550 were compounded in the formula below in Table 10, and their physical properties compared to Nevoll, the standard Class I type of softener.

In general the coumarone polymers, even with carbon black, give equivalent tensiles and elongations to that of Nevoll. This is further illustrated in Table 10 and in Figure I, in which a comparison of the polymers themselves is made. The data show a normal decrease in heat loss as molecular weight increases, and both the ultimate tensile and 300% modulus increase up to a molecular weight of about 450, and then drop off slightly. The hardness, rebound, and permanent set vary only slightly and show no systematic variation, suggesting the possibility that these properties are dependent on factors other than the molecular weight of the softener.

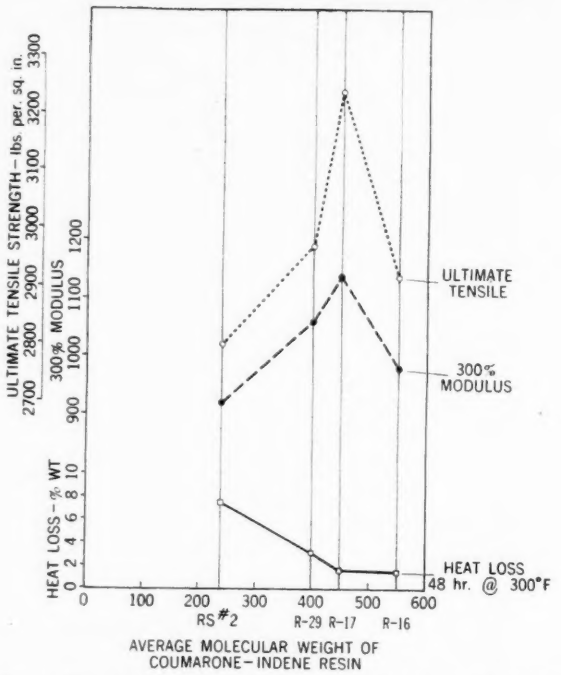
ULTIMATE TENSILE STRENGTH – lbs. per sq. in.
2700 2800 2900 3000 3100 3200 3300
300% MODULUS
900 1000 1100 1200
HEAT LOSS – % WT
0 2 4 6 8 10
ULTIMATE TENSILE
300% MODULUS
HEAT LOSS 48 hr. @ 300°F
0 100 200 300 400 500 600
RS #2
R-29 R-17 R-16
AVERAGE MOLECULAR WEIGHT OF COUMARONE–INDENE RESIN

Fig. 1. Physical Properties versus Molecular Weight of Coumarone-Indene Resins

TABLE 10

Hours Cure @ ° F.	0.75 @ 280° F.	1.25 @ 280° F.	1.25 @ 280° F.	1.25 @ 280° F.	1.25 @ 280° F.
	Nevoll	Neville RS-2	R-29 25° C. M.P. Neville Resin	R-17 Neville Resin	R-16 Neville Resin
GR-S	100	100	100	100	100
Softener	10	10	10	10	10
Stearic acid	2	2	2	2	2
ZnO	3	3	3	3	3
EPC Black, W-6	50	50	50	50	50
Sulphur	1.75	1.75	1.75	1.75	1.75
Santocure	1.5	1.5	1.5	1.5	1.5
Ultimate tensile optimum	2600	2800	2970	3240	2920
Ultimate elongation	540	605	590	597	613
Modulus 300%	1120	920	1060	1140	980
Shore hardness	65	63	66	65	63
Shore hardness after two days @ 300° F.	90	92	95	84	80
Heat loss, % weight	..	7.3	3.1	1.7	1.5
Molecular weight of resins	..	240	400	450	550

Solubility of Sulphur in Coumarone-Indene Polymers

It has already been stated that the coumarone-indene polymers are hot solvents for GR-S in the raw state, and that medium hard coumarone resin is soluble in Buna S and acts as a carrier for sulphur. It should likewise be stated that sulphur itself is soluble in the coumarone resins. For instance, five grams of sulphur may be dissolved in 100 cubic centimeters of RS-2 by warming to 125° C. with stirring. This is a true solution of sulphur in the hydrocarbon, for when cooled to 40° C. the sulphur begins to crystallize. On the other hand if the oil and the sulphur are heated to about 160° C., the sulphur degrades the hydrocarbon, evolving H_2S. Under this condition the solution contains chemically combined sulphur which does not crystallize out.

By virtue of the fact that sulphur dissolves in the coumarone-indene polymers, and the latter in turn are mutually soluble in GR-S, it was decided to determine the type of cure obtained in using such a solution of sulphur. As a consequence the compound given below,

[6] *Ind. Eng. Chem.*, 36, 641 (1944).

L, was blended.[7] This compound was expected to give superior properties because of the improved degree of dispersion of sulphur which would result. The cure, however, proved to be retarded. Although the total sulphur was equivalent to that shown in K, also below, the cure retarding properties of R-16 Neville Resin containing sulphur were made evident. This phenomenon is probably due to slight sulphurization of the polymer during the melting operation, resulting in the formation of arylsulphides which possibly are active vulcanization retarders. Recipe K is included as a control using unsulphurized R-16 Neville Resin.

	Recipe K	Recipe L
GR-S	100	100
R-16 Neville Resin	7.5	10*
Dibutyl phthalate	2.5	
Santocure	1.5	
Tuads-808 Accelerator	0.6	0.6
Sulphur	1	0.95
ZnO	3	3
EPC Black (Wyex)	40	40
Dixie Clay	12.5	12.5
B.L.E.	1	1
Helizone	2.5	2.5
Stearic acid	2	2

Softener	Temperature ° F.	Cure Time Minutes	No.	200% Tensile	Ultimate Tensile	Ultimate Elongation %	Tack	Shore Hardness
K	290	10	1	186	1706	600	Good	50
	290	15	2	250	1842	550	Good	50
	290	20	3	315	1894	550	Good	50
L	290	Uncured in 15 minutes. No physicals taken.						

* R-16 Resin in which was dissolved 5% by weight of sulphur.

Recapitulation

In these pages the intent has been to show the variation of physical properties of GR-S compounds with the three major classes of aromatic hydrocarbons. The superior results obtained with medium-hard coumarone-indene resins in non-carbon black compounds have been made evident; the apparent vulcanization retarding effect by the use of a coumarone-indene polymer in which sulphur has been dissolved has been illustrated. Data on the improvement in fatigue of GR-S by using increased amounts of coal-tar distillate softener (Class I) and of carbon black have been given. Reference has been made to the releases from the Office of Rubber Director, War Production Board, covering numerous types of stocks; and the corresponding class of softener and type of filler have been listed. These data and descriptive comments, it is hoped, may serve to clarify the picture of the comparative uses of the various classes of aromatic hydrocarbon softeners.

[7] Mine Safety Appliances Co., Pittsburgh. Private communication.

Organic Peroxides

(*Continued from page 311*)

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(*To be continued*)

Evaluation of Tear Resistance

(*Continued from page 308*)

72 hours' oven aging at 100° C. caused a uniform drop in tensile strength and elongation. Also, when tested at 100° C., the original stock showed an increase in elongation.

Conclusions

The fundamental fault in the stress distribution of the crescent tear specimen has been discussed.

A new angle tear specimen has been developed with improved stress distribution. The specimen provides greater concentration of the pulling force at the point of tearing. The need of razor nicking the test pieces has been eliminated, resulting in a marked improvement in the uniformity of tear resistance data.

Tests carried out on four elastomers indicated that the crescent specimen values are dominated by the modulus and ultimate elongation of the material. Data obtained with the angle tear specimen indicated that tear resistance is a complex function of tensile strength and ultimate elongation.

Inasmuch as the two specimens indicate different trends in tear resistance it is hoped that this work will stimulate further discussion among rubber technologists on the evaluation of resistance to tearing.

In conclusion, appreciation is extended to R. Bowling Barnes and L. Boor, of the physics research and testing division, for their interest and helpful suggestions in this work. The writer is also indebted to A. R. Davis, of the rubber chemicals laboratory, whose advice and cooperation in the preparation of test compounds were invaluable.

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Tank Lining for Nitric Acid Service

Paramount seamless plastic is a flexible black material with a rubbery texture, said to be one of the few tank linings to give adequate protection for nitric acid passivating service. In the treatment of stainless steel with nitric acid the corrosive action of the solution on the container has been a serious problem. Paramount seamless plastic is applied by casting in thicknesses of ½ inch and one inch.

Special Report of Office of Rubber Director on the Synthetic Rubber Program

Appendix A: Prewar Costs of Production for Plantation Rubber—II

Everett G. Holt

THE background information furnished above is intended to provide perspective for consideration of reports on costs of production of large estates in various regions during the period of International Rubber Regulation, as prepared for the I.R.R.C.

Costs Officially Reported under International Regulation

The International Rubber Regulation Committee secured special cost of production statistics from the Rubber Growers Association (London), the International Association for Rubber Culture in the Netherlands Indies (Amsterdam), and for French Indo-China from Colonel Bernard, representative of France on the Committee.

These cost statistics were allowed guarded dissemination among members of the International Rubber Regulation Committee including advisory members, and through the American advisory member were made available to the Department of State and some members of the rubber manufacturing industry. They were at the time withheld from publication. However, in the "I.R.R.C. Memorandum on Rubber Supplies to the USA over the years 1940/41," forwarded by the Embassy from London October 7, 1943, the I.R.R.C. stated in reference to evidence before the Truman Committee:

"Ever since its inception, the I.R.R.C. has been collecting and tabulating figures relating to the cost of estate rubber, and these figures (calculated according to an agreed formula) were made available regularly to the American representative on the Panel of Consumers. It is surprising that this authoritative, carefully compiled, information was not submitted and examined, and that weight should have been given to statements more emotional than factual."

Since the Truman Committee evidence was given publicity, this statement implies that similar publicity to the I.R.R.C. estate cost data would be proper.

In contrast to the background data heretofore presented, which are mostly based on overall considerations and practical experience in the principal markets as reflected in the tables and reports reviewed above, the costs determined for purposes of the I.R.R.C. were based on an accounting formula.

The terms of reference of the R.G.A. Subcommittee which dealt with this subject were as follows: "To suggest a costing formula which would form a suitable basis for the collection of costs to determine what is a 'fair and equitable price level which will be reasonably remunerative to efficient producers,' the investigation to relate only to a period in which production is being regulated, and to be confined to British countries."

Since the costs related to the regulation period, they were affected by the rate of restriction. The costs reported by the I.R.R.C. and presented below therefore should be considered in connection with the percentages of permissible exports in effect for corresponding periods.

TABLE 9. RUBBER PRICE RANGE AND QUARTERLY PERMISSIBLE EXPORTS

Year	Quarters	Quarterly Permissible Export (Percentages) %	New York Daily Market Prices Plantation Ribbed Smoked Sheets (Cents per Pound) High	Low
1934	1	..	11 5/8	8 1/4
	2	100, June	15 1/2	11 1/4
	3	93 1/3	15 3/4	14
	4	76 2/3	14 1/2	12 1/8
1935	1	75	13 3/4	10 1/2
	2	70	12 3/8	10 1/8
	3	65	12 1/4	11 1/4
	4	60	13 1/8	11 3/4
1936	1	60	16 1/8	13 1/2
	2	60	16 1/8	15 1/8
	3	65	16 5/8	16 1/8
	4	65	23	16 1/8
1937	1	75	26 7/8	20 5/8
	2	80	26 7/8	18 1/2
	3	90	19 5/8	17 1/2
	4	90	17 3/4	14
1938	1	70	15	10 1/4
	2	60	14 1/2	11 1/8
	3	45	16 1/8	14 3/4
	4	45	17 7/8	15 5/8
1939	1	50	16 1/8	15 1/4
	2	50	16 1/8	15 1/8
	3	60	23 1/4	16 3/8
	4	75	20 5/8	19
1940	1	80	19 3/4	18 1/8
	2	80	23 1/2	18 3/8
	3	85	22 1/4	19 1/8
	4	90	21 7/8	19 5/8
1941	1	100	23	19 1/8
	2	100	24 7/8	21 3/8
	3	100	23	21 1/2
	4	120	24 5/8	22 5/8

Prices from: *The Rubber Age (N. Y.)*.

Except in the case of Indo-China, where production was not actually restricted, many costs had to be distributed over a smaller poundage of product when the rate of permissible exports was low than when it was high; the normal effect would therefore be increased costs per pound as the percentage of permissible exports declined.

It was estimated by Mr. James J. Newman, of B. F. Goodrich Co. in November, 1936, that at 75% permissible exports, an estate with a 100% yield of 400 pounds per acre annually could deliver rubber to New York at an all-in cost 0.98c per pound lower than at 60% permissible exports. This indicates the considerable cost effect of this factor theoretically, under the much wider range of permissible exports shown in the preceding table.

The New York high and low market prices for each quarter are also shown in the table, and analysis will show that during the 18 months ended December 1936, and again during the 18 months ended September 1939, a severe restriction was practiced so long as the price did not exceed 17c. Buyers were reluctant to pay over 16c average price in the New York market, and the table indicates this did not satisfy committee objectives.

The formula used by R.G.A. to compile the all-in costs of production for estates in Malaya, Ceylon and other British possessions listed the following main headings:

1. Capital cost
2. Revenue cost f.o.b.
3. Freight and selling
4. Head office expenses
5. Depreciation or wear and tear
6. Profit sharing arrangements
7. Amortization of estate

The capital costs were in 1936 taken at £6.94 *per acre* for buildings and machinery and £34.98 per acre of planted rubber.

The f.o.b. costs covered actual labor, material, and service costs of operation (tapping, preparing the rubber, packaging, upkeep, superintendence, hospital facilities, etc., shipment to port of export, and port charges) plus (apparently) local taxes, quit rent, and export duty. Itemized costs under this heading were not released.

The third item covered overseas transport and entry into the United Kingdom, plus brokerage on sales, and in late 1936 was calculated at 0.60 pence per pound. Higher freight and insurance costs during the later regulation period (and) particularly after the war began, increased this item.

Head office expenses are understood to cover directors' fees, agents' fees, and office costs in London. The R.G.A. subcommittee found wide variation in this item as between companies. At first they recommended 0.40 pence per pound for this item, but in October, 1936, reduced it to 0.30 pence per pound.

Depreciation, or wear and tear on buildings and machinery was figured at 7½% of this capital cost, distributed over approximately 400 pounds average production per acre at 100% permissible exports, or a lower poundage based on the degree of restriction in effect for the period.

The subcommittee originally recommended an average of 0.20 pence per pound to cover bonuses to estate staff or labor and similar profit sharing costs, but in October, 1936, lowered this to 0.10 pence per pound as "a safe minimum" in their opinion.

Estate amortization was taken at 4% on that capital cost, the subcommittee recommending that average productive economic life of trees be taken at 25 years, that is, 30 years from date of planting, as a fair assumption. This was distributed on the same "pounds per acre" basis as depreciation.

Returns were secured from a represen-

tative cross-section of organized estates in Malaya and the Netherlands Indies, and (beginning 1937) from Ceylon. The data provided for Indo-China was even more fully representative.

At the May 31, 1938, meeting of the International Committee, the following summary of annual results for the three preceding years was presented, covering all-in costs of large estates.

TABLE 10. ANNUAL ALL-IN COSTS — LARGE ESTATES, 1935-1937
(Pence per Pound)

	1935	1936	1937
Malaya	6.03	6.13	6.15
Netherlands Indies	6.66	6.20	5.24
Indo-China	5.79	5.51	5.49
Ceylon	..	..	6.66

The figures were stated to represent roughly 44% of total estates in Malaya, 40% in Netherlands Indies, 73% in Indo-China, and 25% in Ceylon.

The figures in pence per pound for Netherlands Indies and Indo-China were influenced by devaluation of their currencies from the end of September, 1936. British currency had been devalued in late 1931.

The returns were compiled monthly for Malaya and Ceylon, quarterly for Netherlands Indies and Indo-China. The following table shows quarterly statistics for 1935-1937, returns for Malaya based on averaging monthly reports differing slightly from the overall annual results shown above.

TABLE 11. QUARTERLY ALL-IN COSTS FOR LARGE ESTATES, 1935-1937
(Pence per Pound)

	Quarters	Malaya	Netherlands Indies	Indo-China
1935	1st	6.06	6.65	6.70
	2nd	6.15	6.46	6.08
	3rd	5.92	6.87	5.86
	4th	6.08	*	5.11
Average		6.05	6.66	5.79
1936	1st	6.35	6.95	6.26
	2nd	6.39	7.28	6.06
	3rd	5.98	6.23	6.01
	4th	6.06	4.98	4.39
Average		6.18	6.20	5.51
1937	1st	6.21	5.35	5.98
	2nd	6.44	5.07	6.13
	3rd	6.04	5.15	5.29
	4th	5.92	5.49	4.87
Average		6.17	5.20	5.49

* No return.

Indo-China continued unrestricted production under the terms upon which this French possession participated in the International Agreement, and this resulted in materially lower cost there than elsewhere, except in 1937. The fluctuation in quarterly costs in Indo-China arose mostly from the seasonal changes in volume of production, very high in the final quarter, low in the first half.

The fluctuations in quarterly costs in Malaya and Netherlands Indies arose partly from seasonal changes in volume of production, but more from effects of the varying percentage of permissible exports, complicated in the latter case by devaluation of Dutch currency in late September, 1936. Incidentally, the statistics for American companies owning rubber plantations in these countries are understood not to have been reported for these tabulations.

In Malaya the quarterly costs fluctuated less than in the Netherands Indies, except in 1937 when the permissible export percentage was high. Malayan internal regulation was so administered, through over-assessment of estates and under-assessment of small holders, as to permit estates to operate at a "percentage of real capacity" higher than the "percentage of permissible exports"; while in the Netherlands Indies the estate assessment was more in line with their actual capacity for production, and hence estate operations there had to correspond more closely to the permissible export rates. In fact estates in Netherlands Indies had a higher assessed production capacity than their quota, and suffered a percentage restriction before application of the permissible export percentages.

Converting values at Federal Reserve annual average exchange rates as shown in Table 20, the annual cost estimates compiled for the I.R.R.C. imply that the "average" estates in Malaya and Netherlands Indies earned "real" profits during these years only to the extent that their sales price for rubber, in terms of United States currency, was above:

TABLE 12. INDICATED PRICES AT WHICH ESTATE PROFITS BEGAN, 1935-1937
(U. S. Cents per Pound)

	Malaya	Netherlands Indies
1935	12.31	13.60
1936	12.70	12.84
1937	12.66	10.80

The New York market price for ribbed smoked sheets in 1935 was 12.37c, and in 1936 was 16.51c; while the average import value per pound of rubber (all grades) reaching the United States in 1935 was 11.39c, and in 1936 was 14.93c. Most estates paid small dividends for 1934 and 1935; dividends improved for 1936 and were in numerous cases excessive for 1937.

The costs returned above for estates were higher than their costs as reported in annual statements of individual companies. The R.G.A. subcommittee, in respect to estates in Malaya and Ceylon, offered the following explanation in October, 1936:

"It is the case that many companies make no annual charges for Depreciation or Wear and Tear and accordingly show a lower cost of production. This came about as follows:—Prior to the slump many companies had created large reserves either from profits or from the issue of shares at high premiums. There is no legal obligation on a Company to provide for loss of fixed assets before paying a dividend, but nevertheless it is customary to provide for Wear and Tear and any Company which does not, usually receives a qualified Certificate from its Auditors. It is perfectly competent for any Company to meet the charge for Wear or Tear either from current or accumulated profits. As accumulated profits were so much greater than current profits in recent years, many Companies chose to debit Wear and Tear to the former and to save the trouble of an annual charge, with a recurring explanation wrote off the whole balance in the Building and Machinery account in one amount. This purely financial arrangement makes not the slightest difference to the actual rate at which Depreciation of Wear and Tear is occurring on the estates. It is this actual rate of depreciation today which is the true current cost and that is the charge which your Committee have investigated and approved. It is impossible to reconcile published costs of such Companies with the true current cost. In effect their published costs are understated and to that extent they are living on their accumulated fat, which is not necessarily an unhealthy proceeding. Your Committee trust if they have not reconciled they have at least accounted for this discrepancy adequately.

"The letter from the Secretary of the I.R.R.C. is correct in stating that it is not the practice of British Companies to charge Amortization of the Estate against their profits. It is also true that transfers from profits to Reserve have not been a noticeably common feature of recent Accounts. It is even more evident, to producers at least, that the price has not risen to that level which covers cost and is reasonably remunerative. Until that state has been reached, producers can only choose between various deserving causes.

"On the assumption, however, that the price will rise to the necessary level, the question of providing for Amortization requires serious attention. Hitherto the rubber industry has been constantly expanding and it has been possible to argue that such plantings in as far as they were done from reserves were a provision for Amortization. That method is now closed and failing replanting, which in British territories is not being undertaken at anything like the permitted rate, it is only a question of a comparatively short time before the whole capital assets of a Company have been consumed.

"In the Report of the original Costs Sub-Committee it was pointed out that there are two ways of Amortization, either by provision for Capital replacement or by the payment of high dividends. The latter is the common method of Mining Companies and any one investing in such Companies is presumed to regard his dividends as being partly a return of Capital. This has not been the common attitude towards Rubber Companies partly because the life is uncertain and mainly because it was a young and expanding industry. Some commonly accepted policy is desirable to escape otherwise inevitable misunderstanding. To pronounce on this question is not within the terms of reference of your Committee, but they would say that it is only by adopting one particular policy that the discrepancy to which the I.R.R.C. refer can be ended."

In the later years of regulation, the I.R.R.C. made effective a definite policy under which, by replanting a certain acreage each year with high-yield trees, the large estates were gradually modernizing their plantations. Continuation of this policy would but for the War have prevented estate obsolescence, and hence rendered less necessary the allowance for amortization of planted acreage. Higher prices were then in effect, however, and an accountant would provide for replanting costs to take the place of amortization. Many progressive estates had adopted this policy even in the 1920's.

At a meeting of the I.R.R.C. when costs were discussed from the angle of competition with plantation rubber produced by native smallholders, "the gist of the discussions was that the natives are in general probably the cheaper producers and the rubber which was needed for world supplies would be obtained from both estates and natives; but the price at which sufficient rubber would come forward would be determined by the cost of production of the highest *efficient* estate producer."

The concept expressed in these words deserves repetition in this study. This

idea means that, if the world needed 1,000,000 tons of rubber and 500,000 tons could be produced profitably at 6c per pound and only another 400,000 tons could be produced profitably at 10c per pound, the world would have to pay whatever price was necessary to make it profitable to produce the remaining 100,000 tons. As a theory and for a short term of years, this concept appeals to the writer as having much merit, but implied fixity of costs for a long term seems not fully warranted on the evidence.

Experience shows that rubber costs have come down to meet price conditions in the past. In other words, when money was difficult to obtain and the world was unwilling to pay a profitable price, the producers of rubber, albeit unwillingly, produced what the world needed at the price the world was then willing to pay. Unduly low prices are as undesirable as unduly high prices, but both prices and costs are dynamic rather than static.

The evidence sufficiently proves that average all-in costs of rubber production during 1935-1937 were considerably higher than in 1931-1933. Although costs have declined in long-term trend throughout the existence of the plantation rubber industry, this has not always been true for short terms. Depression costs do not constitute a fair barometer, whether the crop be rubber, corn, wheat, or potatoes. Costs move upward as well as downwards, depending on conditions.

Although cost of production statistics were prepared for the I.R.R.C. subsequently, the series available in the United States is incomplete.

The monthly statistics shown below for Malayan estates indicate that the accounting formula results continued to show rising costs in 1939 and surprisingly even in 1941 despite then high production.

TABLE 13. MONTHLY ALL-IN ESTATE COSTS—MALAYA, 1937-39-41
(Pence per Pound)

	1937	1939	1941
January	5.75	6.68	7.10
February	6.23	7.13	7.38
March	6.74	7.74	8.01
April	6.81	7.99	8.10
May	6.38	7.31	8.03
June	6.18	7.17	..

Malayan costs aside from depreciation and amortization were reported in the monthly reports for 1939 and 1941, averaging 5.42 in the 1939 period and 6.53 in the five months of 1941. The average allowance for depreciation and amortization in the first half of 1939 was 1.91 pence per pound, and in the first five months of 1941 was 1.19 pence per pound. The cost per pound for these items declined in 1941 because production per acre increased in line with the higher percentages of permissible exports.

Monthly statistics for all-in costs in Ceylon are available for the following dates. The computed Ceylon costs were lower than the Malayan figures during the last month for which data are at hand, although Ceylon costs were higher than Malayan in 1937. Ceylon production is highly seasonal, and costs per pound were normally high in February-March, the wintering season when tapping is usually much reduced.

1939:	Pence per Pound
February	16.57
June	7.65
1941:	
February	16.98
May	7.73

In late 1941 an earlier export duty of 2½ rupee cents per pound was reimposed on rubber exports from Ceylon for purposes of revenue.

The only subsequent report available for Indo-China shows average all-in costs of 4.53 pence per pound for the fourth quarter of 1938 and 4.71 pence per pound for the full year 1938, which is much lower than the average of 5.49 pence for the full year 1937. Costs in the British countries, where production was actually restricted in 1938 very severely, were generally showing a rising trend, but in Indo-China the decline in costs was very pronounced.

The statistics for Indo-China, particularly for 1938, supposedly computed under about the same formula as that used by the Rubber Growers Association, provide basis for an argument that the I.R.R.C. returns reported for Malaya were unduly high. On the other hand, in Indo-China the percentage of trees raised from selected seed and/or budgrafted was higher than for any other country, and annual yield per acre there has compared favorably with other countries.

Range of Costs for Estates

Hitherto this analysis has dealt with average costs for groups of estates by countries. These averages or norms throw no light on the range of all-in costs for different estates comprising the groups, although in connection with Dutch natives a rough estimate was ventured.

The reports on costs prepared for the I.R.R.C. show not only the computed average costs, but also statistics revealing the range of costs for estates in Malaya and the Netherlands Indies.

The following table, presented at the meeting of the I.R.R.C. on May 31, 1938, summarizes these data. It states the percentages of estates' output produced at or below specified costs for 1935, 1936, and 1937. For example, in 1935, 88.2% of the rubber from Malayan estates was produced at 6.50 pence per pound or lower, while in 1937, 95.3% of the rubber from Dutch estates was produced at that cost.

The statistics in this table may be translated to show the percentage of the production accomplished in years covered at any desired range of price instead of cumulatively. To aid analysis the statistics are set up.

Over the three-year period about 81% of the production of estates in Malaya and Netherlands Indies was produced at a cost under 6.75 pence per pound. Under the concept advanced in the I.R.R.C. discussion referred to above, the additional amount of rubber that would be produced at higher all-in selling prices would be only about 19% of the estate total, or say 10% of the world plantation total, taking the computed costs at face value and assuming, as seems generally agreed, that these costs are higher than the costs of other groups of producers.

Charts are included showing these percentages of rubber produced at various costs (pence per pound) of production on large estates in British Malaya and the Netherlands Indies. Chart 1 shows the simple percentages at the various cost levels, cumulative percentages at the same cost levels, and the simple and the cumulative composite percentages averaged for both Malayan and Dutch estates over the three-year period.

Chart 1 pictures the ability of Dutch estates to lower their costs in 1936-1937 while costs in Malaya increased slightly. Devaluation of Dutch currency in 1936 was a factor in this situation; another important factor was the higher rates of permissible exports in 1937. In Malaya the estates had to increase wages and labor forces to meet their quota, and

TABLE 14. ESTATE OUTPUTS PRODUCED AT VARIOUS ALL-IN COSTS, 1935-1937
Cumulative Percentages of Production

Productions Costs (Pence per Pound)	Malaya			Netherlands Indies		
	1935	1936	1937	1935	1936	1937
Under 4.75	..	..	..	0.2	13.5	22.8
Under 5.00	2.5	1.4	..	0.2	19.9	34.1
Under 5.25	12.1	1.4	15.9	2.8	24.8	62.4
Under 5.50	12.1	12.2	15.9	10.1	29.4	70.7
Under 5.75	31.6	26.9	27.1	13.1	32.9	77.8
Under 6.00	47.0	53.7	43.5	18.4	37.4	81.8
Under 6.25	71.4	74.7	61.2	30.1	48.7	90.6
Under 6.50	88.2	74.7	78.4	48.4	57.2	95.3
Under 6.75	88.2	92.2	84.4	59.2	67.4	95.3
Under 7.00	92.6	92.2	84.4	68.1	69.8	96.8
Under 7.25	96.2	95.8	88.4	80.8	70.0	98.0
Under 7.50	97.6	96.6	94.3	86.4	78.0	98.4
Under 7.75	97.6	96.6	94.3	90.9	82.0	98.9
Under 8.00	99.0	96.6	97.3	94.3	89.0	99.0
Under 8.25	99.0	98.5	98.1	96.1	91.5	99.2
Under 8.50	99.0	98.5	98.1	96.3	95.7	99.5
Under 8.75	100.0	98.5	98.1	96.9	95.9	99.6
Under 9.00	100.0	98.5	100.0	98.3	96.6	99.7
Under 9.25	100.0	100.0	100.0	98.8	98.0	100.0
Under 9.50	100.0	100.0	100.0	98.9	98.0	100.0
Under 9.75	100.0	100.0	100.0	99.4	98.4	100.0
Above 9.75	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 15. ALL-IN COSTS FOR MALAYAN AND DUTCH ESTATES
Percentages of Production

Pence per Pound	Malaya			Netherlands Indies		
	1935	1936	1937	1935	1936	1937
Up to 4.75	..	..	..	0.2	13.5	22.8
4.76-5.25	12.1	1.4	15.9	2.6	11.3	39.6
5.26-5.75	19.5	25.5	11.2	10.3	8.1	15.4
5.76-6.25	39.8	47.8	34.1	17.0	15.8	12.8
6.26-6.75	16.8	17.5	23.2	29.1	18.7	4.7
6.76-7.25	8.0	3.6	4.0	21.6	2.6	2.7
7.26-7.75	1.4	.8	5.9	10.1	12.0	.9
7.76-8.25	1.4	1.9	3.8	5.2	9.5	.3
8.26-9.00	1.0	..	1.9	2.2	5.1	.5
9.01 & over	..	1.5	..	1.7	3.4	.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

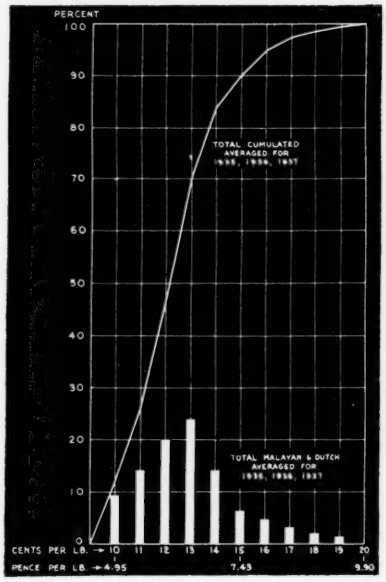

Chart 1. Percentages of Production for Malayan and Dutch Rubber Estates at Various All-in Costs, 1935, 1936, 1937

increased production and prosperity there were accompanied by more liberal use of funds in various ways chargeable to costs under the accounting formula; while the policy on Dutch estates was more conservative, and wages continued low.

This chart is of interest as showing the various forms of curve which result from plotting cumulative percentages of production for different groups of estates or the same group for different years. It takes little imagination to picture the probable curve for Dutch natives, for example, or for the lower-cost estates of Indo-China.

The combined chart based on composite three-year averages of percentages for both Malaya and the Netherlands Indies, probably comes closer to picturing the composite trend for all producers of plantation rubber and is a further stimulant to the imagination.

Additional revealing and interesting information subsequent to 1937 is provided in a report covering costs of Netherlands Indian estates during the fourth quarters of 1938. This report shows costs before allowances for depreciation, amortization, and export tax as well as all-in costs.

During this quarter the permissible rate of exports was only 45%, and yet the average operating costs on these estates were reported at only 4.25 pence per pound; depreciation averaged 0.53 pence, and amortization 1.13 pence (these would be much lower at a higher rate of permissible exports); while the specific export duty was 0.81 pence per pound.

The table in which these statistics were detailed is reproduced below; the groups of companies are arranged in order according to costs of production before depreciation.

This table shows how export taxes increase all-in costs. Export taxes from any individual country, therefore, in normal conditions reduce the competitive strength of its producers in foreign countries.

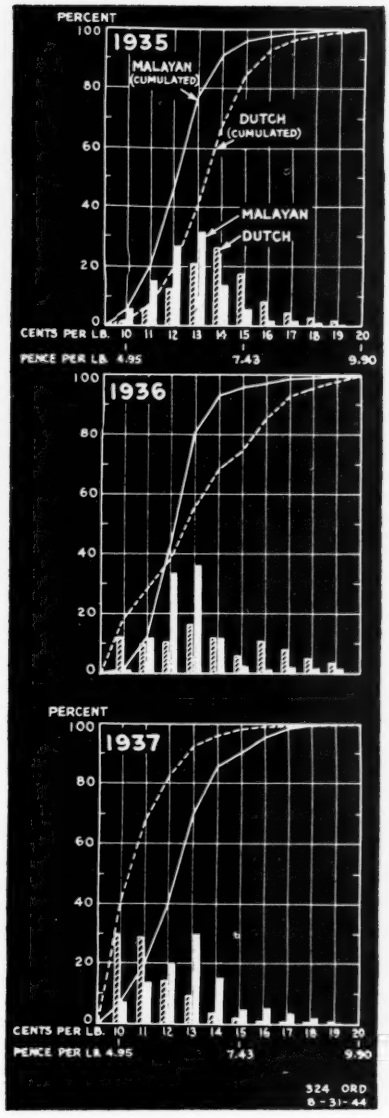

Chart 1.

TABLE 16. NETHERLANDS INDIAN ESTATES, ALL-IN COSTS, 4TH QUARTER, 1938
(Pence per Pound)

Production % of Total	Before Depreciation	Wear and Tear	Amortization	Export Duty	All-in
1.28	1.91	0.44	0.94	0.81	4.10
0.73	2.58	.37	.79	.81	4.55
2.76	3.06	.57	1.21	.81	5.65
17.33	3.17	.44	.95	.81	5.37
5.02	3.42	.44	.95	.81	5.62
8.87	3.86	.61	1.30	.81	6.58
10.13	3.84	.37	.79	.81	5.81
13.48	4.23	.49	1.05	.81	6.58
12.24	4.68	.67	1.44	.81	7.60
6.40	4.84	.59	1.26	.81	7.50
9.75	4.95	.46	.98	.81	7.20
1.18	5.53	.76	1.62	.81	8.72
5.39	5.57	.57	1.22	.81	8.18
0.85	6.16	.87	1.85	.81	9.69
0.63	6.24	.72	1.54	.81	9.31
0.96	6.61	.82	1.76	.81	10.00
0.76	6.70	.69	1.46	.81	9.66
0.95	6.94	.67	1.43	.81	9.85
0.21	7.35	.81	1.74	.81	10.71
0.40	7.79	.99	2.11	.81	11.70
0.50	7.62	.61	1.30	.81	10.34
0.18	8.18	.88	1.87	.81	11.74
100.00	4.25	.53	1.13	.81	6.72

The 4.25 pence (8.65 U. S. cents at 1938 exchange) per pound average cost of production before depreciation and amortization, plus 0.81 pence (1.65 U. S. cents) export taxes compares with 5.42 pence reported for Malayan estates before amortization and depreciation during the first half of 1939 when the rate of permissible exports was 50%. The export tax on estate rubber from the Netherlands Indies was apparently set at a figure that left the average producer there with a slight price advantage over his average Malayan estate competitor. The influence of Malayan export taxes, and quit rents, was not revealed in the cost statistics collected for Malayan estates.

Depreciation and amortization at 1.66 pence per pound for the Dutch estates with 45% permissible exports (and they were restricted more severely than the estates in Malaya as explained elsewhere) compare with 1.91 pence per pound for the same items, during the first half of 1939 on Malayan estates with the official export rate at 50%. The Dutch estates, therefore, had a considerable advantage on these items, taking the computed allowances at face value.

Malayan Export Taxes

The chief rubber-producing section of British Malaya is the Federated Malay States, and annual reports of the government there show both the exports of rubber and the duty paid thereon for the 1934-1938 period. The tax June 1, 1934, was a cess of 1.0c Straits per pound; this continued to July 1, 1935, when it was changed to 0.7c Straits per pound. This was reduced to a nominal figure of 0.05c Straits per pound October 1, 1936, when a sliding scale of ad valorem export duties, increasing with the price of rubber from 1%, when the price was under 20c Straits, to 3½%, when the price was 35c Straits or over, was made effective. The following table shows the taxes collected, reflecting the influence of ad valorem taxes in increasing prices more when they are high than when they are low, and may be considered reasonably indicative of the effect of export taxes as a cost item on British Malayan rubber.

TABLE 17. FEDERATED MALAY STATES RUBBER EXPORT TAXES

	Rubber Exports Long Tons	Export Tax Dollars Straits	Cents per Pound Straits	Exchange Rate	U. S.
1934	256,516	2,160,157	0.376	0.5901	0.222
1935	194,478	2,247,497	.513	.5717	.293
1936	182,873	2,817,180	.688	.5825	.399
1937	247,386	4,763,184	.860	.5797	.498
1938	171,248	1,553,483	.405	.5692	.230
1935-37.	624,737	9,827,861	.710	.5780	.410

Since the export tax on rubber from the F. M. S. was so much lower than on estate rubber from the Netherlands Indies in 1938, and the overall costs of Malayan estates were higher than for Dutch estates, the costs exclusive of taxes for Malayan estates were then much higher than for Dutch estates.

On April 2, 1940, there was enacted a special war export duty of 2½% ad valorem on the export of rubber produced in the Federated Malay States on land owned or lawfully occupied by persons who are not liable under the laws of the

(*Continued on page 326*)

EDITORIALS

More Tires Has Always Been a War Production "Must"

AN EMERGENCY conference was held in Washington on November 22 between top executives of twenty tire manufacturing companies and officials of the WPB, WMC, War and Navy Departments, and the Combined Production and Resources Board for the expressed purpose of developing a program for expanding the output of large bus and truck tires to meet a new increase in military demands. It was indicated that the entire industry capacity is being restudied in order to find means of obtaining the necessary increased production. It is not our purpose to depreciate the seriousness of the situation, but we would like to point out that the need of very large increases in the production of tires of all types has been constantly stressed by the Office of the Rubber Director and the industry for more than a year and that the last report from the Rubber Director contained figures which would seem to show that if all facilities were used to their fullest extent, the 25% increase in the production of heavy-duty tires required for the first quarter of 1945 could be met.

As long ago as September, 1943, industry and government officials also met in Washington and planned a $95,000,000 program for the expansion of tire production facilities, but the size of this program was reduced to $70,000,000 because of pressure from the C.I.O. United Rubber Workers Union who opposed the construction of new plants away from established areas and promised greater output in existing plants if additional machinery were installed.

Apparently the Rubber Director a few weeks later was not satisfied with the tire production outlook for in Progress Report No. 4 of November 10, 1943, he said, "Expansion of plant facilities alone will not produce the volume of tires and other products needed to support the war. Greater output per-man-hour on the part of labor, reduction in absenteeism, more efficient flow of materials, better management planning, and improved distribution of manpower are essential to this program."

Progress Report No. 5 issued on March 17, 1944, reviewed both the military and civilian tire production outlook and emphasized the enormous increase in the demand for heavy-duty tires called for by the war and stated that the production of large-size tires was limited by tire manufacturing facilities.

Tire production difficulties were aggravated in the Spring of this year by the loss of much skilled manpower to the Army and Navy.

The Rubber Director in a statement on March 18, 1944, said that "unless steps are taken to stop the induction of skilled and technically trained men from the rubber program, we will be unable to meet anything like the estimates forecast in my report and will fall far short of making estimated requirements of heavy-duty tires."

Progress Report No. 6 of July 25, 1944, led off with another statement that there was a serious shortage of heavy-duty truck and bus, airplane, and tractor tires and said that less than 6,000 additional workers stood between the present shortage and an ability to meet all essential requirements.

It was in this Report No. 6 that figures for production capacity of truck and bus tires, "based on full use of all facilities" of 5,176,000 units for the first quarter of 1945, as compared with "estimated production based on present conditions" of 4,250,000 units, were given. The new requirements, as reported in Washington on November 22 last, call for a production of 4,941,864 units during the first quarter of 1945. The industry at the present time does not promise much more than 4,000,000 large-size tires for the first 1945 quarter. The problem to a considerable extent then resolves to a determination of what prevents "full use of all facilities" instead of "production based on present conditions." Is it because "all facilities" are not available or that "full use" cannot be achieved?

No less authority than the War Department has stated that the production of heavy-duty tires has a direct effect on the war in Europe as well as in other theatres. The "big push" is now on in Europe and is soon to be followed by a "big push" in the Pacific, but both will have to slow down unless a "big push" in the tire production plants gets under way at once and is maintained until our enemies are overwhelmed by a great weight of planes, guns, trucks, and tanks, all rolling on tires and treads of American synthetic rubber.

Holiday Greetings

WITH this issue, which precedes the holiday season, INDIA RUBBER WORLD and its staff want to take this opportunity to wish its readers a Very Merry Christmas and what we all hope will be a Happy and Victorious New Year.

Although the problems and trials of this third year of the war have probably been more numerous than those during 1943, the achievements of 1944, which are headed by the successful invasion of France and the crossing of the borders into Germany both from the East and the West, together with the beginning of the liberation of the Philippines and preparations for carrying the war in the Pacific to an early and victorious conclusion, were all helped to a very great extent by the success of our synthetic rubber program and the use of this rubber in the manufacture of military and essential civilian products. It is hoped that management, labor, and government will continue to work together so that there will be no shortage of products of the rubber industry to delay Victory in both Europe and Asia at an early date.

Scientific and Technical Activities

Collyer Speaks at S.P.I. Meeting

ONE of the features of the meeting of the Society of the Plastics Industry, Inc., which was held at the Waldorf-Astoria Hotel, New York, N. Y., November 13 and 14, was a talk by John L. Collyer, president of The B. F. Goodrich Co., on the "Outlook for Rubber and Plastics." The rubber and plastics industries have always had a great deal more of mutual interest, technically, than has been generally realized, Mr. Collyer said and added that he believed they are likely to find their objectives and activities more and more interwoven in the future.

"Of utmost importance is the fact that both these great industries have their sights clearly trained on the main Target for the Tomorrow after Victory—a high level of employment and an expanding economy of peacetime production," Mr. Collyer pointed out.

Rubber manufacturers are now well aware that rubber is a plastic and most of them are in the plastics business more or less directly with some non-rubber or semi-rubber products, and the various synthetic elastomers, both thermoplastic and thermosetting, have bridged the gap between the rigid plastics and elastic vulcanized rubbers. It was emphasized that the Goodrich company was concerned no longer with any fixed ideas that any one material was the best for use in their many products.

"We know that the field is wide open, for example as between natural rubber and synthetic rubber—even including rubber-like plastics—and the choice will go, in any given case, to whichever one proves economically soundest. This is the way to expanding production, better products, wider usefulness," Mr. Collyer declared.

The total world output of natural and synthetic rubbers, by the end of the second year after liberation of the Far Eastern rubber plantations, was estimated as 2,800,000 tons; 1,600,000 tons of natural and 1,200,000 tons of synthetic, and this is more than twice as much rubber as the world has ever used in one year. For tires and most other big-volume uses, natural rubber is still considered the better article, and if it were available right now, it probably would command a sizable premium, pound for pound, over synthetic. But most of our experience with synthetic materials of many kinds in this country indicates that this situation is "subject to change without notice," the speaker stated.

One reason why the rubber industry no longer is "wedded exclusively to rubber—natural, synthetic or reclaim," Mr. Collyer indicated, is the "great, but largely unappreciated role that many of the country's plastics have played in helping relieve the critical rubber supply situation." He said the total tonnage of rubber "relief" accounted for by polyvinyl chloride and other plastics during the last two war years in filling roles ordinarily served by rubber was greater than the tonnage of tree rubber obtained from all South and Central American sources combined.

Over and above whatever production of synthetic rubber or other American-made materials might be needed to assure military security, his company should like to see competition with natural rubber or any other material; the aim is low-cost production, broader markets, increased employment, and a higher standard of living, Mr. Collyer said and in conclusion called for application of "the same energy, the same unstinting devotion, and the same determination to solving postwar problems" as were brought to bear on the rubber problem.

"American industry is today demonstrating that it is our greatest weapon in war, one which our enemies wholly underestimated," he said, adding that by success in meeting the problem of reconversion it can "reenforce the faith of millions who regard it as the backbone of our American standard of living."

Machinery for Plastics Also Discussed

Among the other papers of interest to the rubber industry presented at this meeting was a paper by N. J. Rakas and W. P. Cousino, of the Chrysler Corp., which was entitled "Chrysler Plastic Machine for Continuous Injection and Extrusion of Thermosetting Plastics." Reference was made to previous information recently made public regarding the use of this machine for the production of molded articles from rubber, and a detailed explanation of the operation of the machine for the injection and extrusion of thermosetting plastics was the main purpose of this paper. Most of the results to date with thermosetting plastics have been on a pilot-plant scale, but it was stated that it will be only a matter of time before it can definitely be said that the machine is ready for mass production fabrication of plastics.

W. J. Johnson, of National Rubber Machinery Co., discussed "New Trends in Extruding Equipment." It was stated that the manufacture of wide sheet materials is expected to cover a broad field in the packaging industry particularly, and it is expected that many items formerly molded will be blanked from such extruded sheet as it leaves the machine, thereby eliminating several operations. The adaptability of National Rubber's 3½-inch plastics extruder, which has a cylinder built up of three sections, was explained. The use of one section provides the right length for extruding rubber; while two sections are used with that group of materials such as polyvinyl chloride, cellulose acetate, polystyrene; while materials necessitating high temperatures require the use of all three sections of the machine. Heads for the straight extrusion of rod, tubing, strip, etc., or heads for insulating wire are readily interchangeable by the removal of a king pin on which these heads hinge.

There is a great deal of interest in the covering of metal shapes or tubing such as bus rails, metal furniture tubing, etc., and such work can be done readily with new, improved, and streamlined crossheads with the necessary accessory equipment for the feeding of short lengths of tubing, the speaker said. Several years ago there was much discussion about very large extruders for use with plastic materials, but the trend now seems to be toward the installation of smaller, high production machines. Mr. Johnson recommended the type of installation where two extruders are used with one head, as in the rubber industry for the extrusion at the same time of tread and sidewall stocks, for consideration where plastics of different colors are required in one piece. The best means of heating plastics materials in extruding equipment was discussed. Although plant steam was considered satisfactory for extruding rubber and sometimes polyvinyl chloride, materials such as cellulose acetate, butyrate, ethyl cellulose, and polystyrene which require higher temperatures have been extruded by means of an electric steam heater, by means of circulating hot oil, and by machines heated directly with electricity.

For wire covering, more practical and efficient accessories such as a combination capstan and water cooling box and take-up are being designed. The speaker stated that large electrical companies which have produced much plastic coated wire during the past two years, indicate that they will continue to do so when the war is over. A new development which was reported to have created interest is a complete 1½-inch plastics extruder with all accessories for wire covering which has been built into one compact unit 12 feet long.

Herringbone gear drives are being incorporated in all extruders to provide quiet, efficient service, and radial and thrust bearings will use the same oil as the gears, thereby eliminating the need of daily lubrication.

Paul Quinn, consulting engineer from England, spoke on "Plastic Extruding in England and the United States." This speaker, who is in charge of research and development for Paul Quinn, Ltd., the present owner of Wallington, Weston & Co., Frome, England, described his company's work during the war in producing ½-inch and ⅜-inch A.R.P. stirrup pump hose using old 3½-inch and a new 4½-inch screw extrusion machine made by Francis Shaw & Co., Ltd. Mr. Quinn said that mechanically the only difference between the new and the old machines was chromium plating and roller bearings; the final product was the same, and that this was all he could report on the improvement in rubber extrusion for the last 60 years.

Screw extrusion is referred to as continuous extrusion for the reason that it is possible to feed stock to the machine indefinitely. In actual fact this property is of little importance since no extruded product is for sale in lengths exceeding the capacity of the machine for more than 15 minutes, if that, if any thought of monofilament or similar extrusion is eliminated, this speaker said. It was then pointed out that an injection extrusion machine having a barrel capacity of stock for a 15-minute run can produce the same products as far as marketing is concerned, as a screw-type machine. Mr. Quinn did not consider the injection-type extruder any improvement over the screw extruder for rubber or synthetic

rubbers since these materials under heat soften only to a limited extent.

It was emphasized that the method of heating plastics, which are among the best non-conductors of heat, by conduction in extruding machines could not be considered entirely satisfactory in relation to the energy used, and that the whole method on the face of it seemed wrong. The use of high-frequency radio waves was considered to be a much more logical method, and it was further stated that by use of this method of heating it should be possible to open up the field and obtain the advantages of low-pressure extrusion for such work as the coating of relatively low strength yarns and cords with plastic materials. In conclusion Mr. Quinn said that it would appear that owing to the extremely large supply of raw material and electronic appliances available in this country, America should be in a position to gain an important lead in a really new and novel development in the field of plastics.

Exhibit at Plastics Conference

An exhibit of plastics for war and peacetime uses includes articles and applications for houseware, apparel, shoes, toys, games, sports, musical instruments, office appliances, packaging, communications, aviation, marine, hardware, lighting, and industry in both thermosetting and thermoplastic materials. Products of elastomeric plastics included electrical insulation, cable, tubing, architectural moldings, hydraulic packings, impregnated and coated moisture-proof fabrics of various vinyl types. Aircraft hangar curtains of Geon coated fiberglas and polyvinyl acetate coated nylon screening were among the large assortment of coated natural and synthetic fabrics. Ethylcellulose protective coating for shipping machine parts was also shown.

R. I. Club Elects Officers

THE Rhode Island Rubber Club meeting November 3 at the Crown Hotel, Providence, R. I., was attended by about 100 members and guests. After dinner and a short business meeting an illustrated lecture, "The Netherlands East Indies before, during, and after the War," was given by Roelof A. Shotman, former mayor of Batavia, Netherlands India. Mr. Schotman said that the natives desired the return of the freedom previously enjoyed under Dutch rule. Security for the people and the wealth of the islands is entirely dependent upon the formation of a world organization for the prevention of aggression, the speaker stated.

Officers for the coming year elected at the meeting are: chairman, J. M. Scott, secretary, Henry L. Scott Co.; and secretary-treasurer, S. I. Strickhauser, development manager, United States Rubber Co.; Executive committee members are: Walter Linnell, Collyer Insulated Wire Co.; O. E. Lowe, Davol Rubber Co.; F. S. Bartlett, U. S. Rubber; S. J. Lake, Respro, Inc.; H. E. Murch, Goodyear Footwear Co.; H. W. Greenup, Firestone Rubber & Latex Products Co.; L. T. Wilson, American Wringer Co.; M. J. Linn, Xylos Rubber Co.; and L. K. Morrow, Anaconda Wire & Cable Co. H. P. Fuller, Pequanoc Rubber Co., was chairman of the nominating committee.

Rubber Reserve Co. Circulars

UNDER date of October 23, 1944, Rubber Reserve Co. issued Circular No. 30 having to do with the distribution of GR-A, GR-S-Black-1, GR-M, GR-M-10, GR-I, and plant clean-up material (GR-S and GR-I) and Circular No. 32 regarding the submission of requests for permission to purchase GR-M and GR-M-10. Circular No. 33, issued on October 21, was on the subject of claims for quality or weight adjustment on synthetic rubber shipments.

Circular No. 30 states that a special-purpose synthetic rubber of the Buna N type is now being produced in the copolymer plant at Louisville, Ky., operated for the account of Rubber Reserve by The B. F. Goodrich Co., and that this rubber, designated as GR-A, is now available for limited distribution at a price of 50c a pound plus a uniform freight charge of ½c a pound in carload lots and at appropriate prices for less than carload lots. Purchase requests should be addressed to the Rubber Bureau, WPB.

A special grade of GR-S containing carbon black, designated as GR-S-Black-1, containing 50 parts of EPC black combined with 100 parts of standard GR-S, is now available for limited distribution at a price of 14¾c a pound, plus the uniform freight charge as provided in Circular No. 17[1] (as supplemented), all such sales to be made ex producing plant or ex warehouse, Circular No. 30 also reveals. It is contemplated that other types of carbon black will be combined with either the standard or special types of GR-S in the future to form other grades of GR-S Black, and such grades will be announced in a later circular and assigned successive numerical designations. Purchase requests should be addressed to the sales division of Rubber Reserve Co. following Circulars 27[2] and 32.

A special grade of GR-M containing an antioxidant is now available for limited distribution at a price of 27½c a pound, plus the uniform freight charge as provided in Circular No. 17 (as supplemented). This rubber has been assigned the designation of GR-M-10. Purchase requests should be addressed to the sales division of Rubber Reserve Co., following Circular No. 32. In order to facilitate distribution to consumers on the West Coast, Rubber Reserve has decided to continue in effect the warehouse distribution points heretofore maintained by du Pont, and du Pont has agreed to act as agent for the Rubber Reserve in effecting such sales. The sales price established by Rubber Reserve for all sales of GR-M (including GR-M-10) made from such distribution points is 29½c a pound ex warehouse. Purchase requests should be addressed to the sales division of Rubber Reserve Co. as provided in Circular No. 32, but in addition related Synthetic Rubber Purchase Permit should be sent to Rubber Reserve Co. in care of du Pont at either 5801 S. Broadway, Los Angeles, Calif., or 235 Second St., San Francisco, Calif.

[1] INDIA RUBBER WORLD, May, 1943, pp. 169-73; June, 1943, p. 264.
[2] *Ibid.*, June, 1944, p. 316.
[3] This standard specification for GR-I and a supplement on GR-S for wire and cable use, also issued on November 1, 1944, will be published in a future issue of INDIA RUBBER WORLD. Copies are, of course, available from Rubber Reserve Co. in Washington, D. C.

Distribution from such warehouse points in California is optional with the consumer, and the consumer may also obtain GR-M (including GR-M-10) in either carload or less-than-carload lots directly from the government-owned producing plant at Louisville, Ky.

Circular No. 30 reports that all GR-I sold by Rubber Reserve on and after November 1, 1944, will be on the basis of standard specifications effective on November 1, 1944.[3] In addition on and after November 1, Rubber Reserve will have available for limited distribution the following special grades of GR-I, all having a price of 15½c a pound plus the uniform freight charge as provided in Circular No. 17[1] (as supplemented):

GR-I-50P. This grade is the same as standard GR-I, but it is produced by plastication of a high-viscosity GR-I with RPA # 3.

GR-I-40. This grade has a Mooney viscosity between 30 and 40 (as compared with a Mooney viscosity for standard GR-I between 40 and 50). It otherwise conforms to the specification for standard GR-I in every respect.

GR-I-40P. This grade is the same as GR-I-40, but is produced by plastication of a high-viscosity GR-I with RPA # 3.

GR-I-60. This grade has a Mooney viscosity between 50 and 60. It otherwise conforms to the specification for standard GR-I in every respect.

GR-I-60P. This grade is the same as GR-I-60, but is produced by plastication of high-viscosity GR-I with RPA # 3.

GR-I-70. This grade has a Mooney viscosity above 60 and is intended for specialty purposes where a high viscosity is required.

Purchase requests should be addressed to the Rubber Bureau, WPB.

Circular No. 30 also reveals that the various copolymer plans now producing GR-S have accumulated certain plant clean-up material which includes tank cleanings, floor sweepings, drier drippings, etc., and that pending development of proper equipment for further cleaning up of such material and processing it to a reasonable state of cleanliness so as to permit its regular sale at the established price of 18½c a pound, Rubber Reserve Co. will sell such material at a price of 16.65c a pound, plus the uniform freight charge in accordance with Circular No. 17[1] (as supplemented). All such sales will be made ex producing plant or ex warehouse, with no representation or warranty as to quality. Purchase requests should be addressed to the sales division of Rubber Reserve Co. as provided in Circulars 27[2] and 32. The same type of plant clean-up material from the GR-I plants which has been strained, but has not been completely cleaned of all foreign material and which has a variable plasticity will now be sold "as is" at a price of 10c a pound. All plant clean-up material accumulated in the future will be strained and will be identified by a red line across the top of the package. This material will be sold at a price of 13.95c a pound. There will be added to such prices the uniform freight charges in accordance with Circular No. 17[1] (as supplemented), and all sales will be made ex producing plant or ex warehouse, with no representation or warranty as to quality. Purchase requests should be addressed to the Rubber Bureau, WPB.

All of the above new grades of synthetic rubbers will require that the certificates reflecting consumption for "War Orders" be submitted monthly by each manufacturer to Rubber Reserve Co. Claims for quality and weight adjustments should be submitted within 30 days from the date of shipment to Rubber Reserve in accordance with the provisions of Circular No. 23.[4]

Circular No. 32

Circular No. 32, "Requests for Permission to Purchase GR-M and GR-M-10," states that effective with the sale of GR-M and GR-M-10 for delivery during the month of December, 1944, and subsequent months, requests for permission to purchase these materials should be addressed to the Sales Division, Rubber Reserve Co., 811 Vermont Ave., N.W., Washington, D. C., instead of to the Rubber Bureau, WPB, as has been the custom heretofore. Form WPB 3662 and WPB 3682 will no longer be required for GR-M and GR-M-10. Letters should be submitted in triplicate in accordance with a sample letter attached to this circular and should be mailed in sufficient time to reach Rubber Reserve not later than the twelfth day of the month preceding the month of delivery.

Circular No. 33

Entitled "Claims for Quality or Weight Adjustments on Synthetic Rubber Shipments," Circular No. 33 refers to Circulars 17,[1] 19,[5] and 23[4] and states further that in any case in which the shipment to a particular consignee constitutes less than a full carload lot, but such shipment has, at the request of the consignee, or his agent, been consolidated with one or more other permits for the purpose of constituting a full carload, Rubber Reserve will recognize a claim for refund on the basis of the carload rate, but in the event of such refund no adjustment will be made by Rubber Reserve for weight claims submitted by the consignee unless a review of the shipping records maintained by the producing plant reveals that an error was made in the total weight shipped in such car. Claims for weight adjustments in all cases shall be filed in accordance with instructions in Circulars 22[6] and 23,[4] and in addition shall be accompanied by appropriate weight certificates issued by a certified public weigher. The adjustment, if allowed, will include compensation for the charges of the public weigher.

[4] India Rubber World, Mar., 1944, p. 598.
[5] *Ibid.*, June, 1943, p. 264.
[6] *Ibid.*, Aug., 1943, p. 486.

Extender for Synthetic Rubber

A NEW extender and plasticizer offered to the rubber trade is "3 BN", a, non-greasy, oil resistant, light-colored solid, said to impart green tack to synthetic rubber and produce smoother stock. It is further claimed that "3 BN" will shorten mill breakdown time, promote filler incorporation, and reduce shrinkage. The recommended replacement is 30 parts "3 BN" in stocks containing 100 parts GR-S. A Captax accelerated stock containing 70 parts GR-S and 30 parts "3 BN" cured 15 minutes at 307° F. No change in sulphur ratio is required. The extender is a product of the Hudson Rubber Extender Co.

Dewey Receives Medal

THE Chemical Industry Medal for 1944 was presented to Bradley Dewey, president of Dewey and Almy Chemical Co. and former Rubber Director, on November 10 at a joint meeting of the American Section of the Society of Chemical Industry, the New York Section of the American Chemical Society, and the New York Section of the American Institute of Chemical Engineers, held at the Hotel Roosevelt, New York, N. Y. The chairman of the S.C.I. American Section, Norman A. Shepard, presided. Charles Almy, vice president of Dewey & Almy, was scheduled to speak on the personal side of the medalist's life, but since Mr. Almy could not be present, his talk was read by John A. Lunn, also a vice president of Dewey & Almy. Vannevar Bush, president of the Carnegie Institution of Washington and head of the Office of Scientific Research and Development, told of Colonel Dewey's scientific and technical accomplishments, with special reference to his activities in the Chemical Warfare Service in World War I. Karl T. Compton, president of the Massachusetts Institute of Technology, addressed the meeting on the medalist's contributions to the field of education. Dr. Compton told of Colonel Dewey's active interest in Harvard University, M.I.T., and secondary schools and stated that an alumnus with the interest, judgment, ideals, and energy of Bradley Dewey was an asset to any institution.

The medal, which may be awarded annually for valuable application of chemical research to industry, was presented to Colonel Dewey in recognition of his work in colloid chemistry, especially as pertaining to rubber latex, and his accomplishments in administering the synthetic rubber program during the critical war period. The presentation was made by Foster Dee Snell, following which Colonel Dewey gave an address on "The Role of Organized Research and Business in American National Defense."

Big business wrought the miracle of research and production which enabled the United Nations to achieve supremacy in technological warfare, Colonel Dewey declared.

"We have today many large companies, still generally unappreciated, which have contributed greatly to the miracle of American production which has so well and amply equipped our Armed Forces and those of our Allies. I am a small business man. I believe in small business, but I believe that if the time were to come when many of the leaders of large business were not graduates from small businesses, large business itself would suffer," he said. "Despite my belief and my faith in small business, I know that the building of the synthetic rubber industry and many other achievements on the industrial fronts of this war are proof that without the teamwork of research and production led by big business, this country would have faced—might have succumbed to—disaster.

"In this country fast-growing big business, which, being human, unquestionably in the past was guilty of mistakes, has been cast in the role of whipping boy by some politicians in their lust for power or for insecure security or in their loss of confidence in the American pioneering spirit. It is our duty to oppose these men and their doctrines and by speaking out against them let the American public see the facts as they are," Colonel Dewey added.

"America, armed and powerful, must remain alerted for war for a long time to come," the speaker stated. "No reasonable person can doubt that if the peace of the world is to be kept, America must be ready on the land, on the sea, and in the air. With no two points on the globe further apart than 60 hours by air, we shall have no leisure for bumbling next time. We must be prepared to hurl our hard hitting teams of scientists, executives, and production men into the battle with the same speed that our bombers take to the air. If this is to be possible, now is the time when we must begin to overhaul our selective service laws for the future."

The United States must continue military research after the war, Colonel Dewey asserted and emphasized that although the Office of Scientific Research and Development cannot continue after the war, the government must find ways to carry on the work left unfinished, as well as that research essential to the Armed Services which offers no hope of profit in peacetime and hence does not appeal to industry.

Above all, Colonel Dewey concluded, "We must remember that in many cases it was the teamwork of scientists, engineers and production men in big industry which saved us on the production front in this war. We must keep these teams intact and healthy so that we may turn to them when future danger threatens."

Bernard M. Baruch was among the honored guests at the speakers' table, and Dr. Shepard and Dr. Kimball, of the Society of Chemical Industry, read many telegrams and letters from Colonel Dewey's associates in the rubber program, such as James B. Conant, William Jeffers, Maj. Gen. Porter of the Chemical Warfare Service, Bruce K. Brown, E. R. Weidlein, and Willard H. Dow, congratulating Colonel Dewey and expressing their regrets that they could not attend the medal presentation.

Holds Election Party

THE Los Angeles Rubber Group, Inc., held an informal election party November 7 at the Mayfair Hotel, Los Angeles, Calif. About 75 members and guests attended. After dinner and a short business meeting Lt. (jg) Monroe Beyer told the group of his experiences in the South Pacific and of various instances when his knowledge of rubber had been of help. Owing to projector failure it was impossible to complete the showing of a Disney film, "The Amazon Awakens." The picture will be reshown at a future meeting.

Prizes of the evening included: a $25 War Bond, donated by H. F. Parkerton, Sr., Farrel-Birmingham Co., Inc., and won by H. K. Calkin, Kirkhill Rubber Co.; beverage donated by Charles Churchill, B. E. Dougherty Co., won by Stokes Royal; a combat jacket donated by W. F. Vonder Reith, Sierra Rubber Co., won by H. Chamberlin, Kirkhill Rubber; and a world globe and stand donated by E. L. Royal, H. M. Royal, Inc., and won by G. K. Norton, Kirkhill Rubber.

During the latter part of the evening the group listened to radio election returns.

Rubber Group Offers $1,000 for Synthetic Reclaim Methods

THE Chicago Rubber Group has announced a prize contest for the best papers on the reclaiming and handling (processing, compounding and utilization) of cured synthetic rubber scrap. Three prizes of $500, $300, and $200 each are offered. The contest is open to any person in the United States or Canada. The closing date is midnight of August 1, 1945. There is no set topic upon which the papers must be based. Some of the headings under which the subject may be handled, according to the committee are: (1) separation and segregation of synthetic scrap rubber; (2) methods of identifying synthetic scrap rubber; (3) reclaiming synthetic scrap rubber; (4) compounding studies which will result in greater use of ground synthetic scrap rubber; (5) compounding studies which will result in greater use of reclaimed synthetic scrap rubber. Additional information concerning this contest may be obtained from the chairman of the Chicago Rubber Group, Bruce Hubbard, 1 N. LaSalle St., Chicago, Ill.

The Chicago Group met November 17 at the Morrison Hotel. At this meeting, known as Indiana Night, "the 1945 Chicago Rubber Group Year Book" was presented to about 225 members and guests. D. F. Fraser, manager of the rubber division, Monroe Auto Equipment Co., Monroe, Mich., offered a paper on the "Chrysler Rubber Injection Molding Process." The annual Christmas party and dinner dance is scheduled for December 15 at the Morrison Hotel.

Akron Fall Meeting

THE fall meeting of the Akron Rubber Group was held November 3 at the Mayflower Hotel, Akron, O. About 200 members and guests were present. Following dinner, Russell Weisman, economist and newspaper columnist, addressed the Group on current economic problems and their probable effect on immediate and postwar industrial activity. Plans are being made for the regular winter meeting in mid-February.

Canada Assured Postwar Synthetic Rubber

THE Rubber and Plastics Division, Montreal Section, Society of Chemical Industry, met November 10 in the Ritz-Carlton Hotel, Montreal, P. Q., Canada. After dinner R. C. Berkinshaw, president, Polymer Corp., Ltd., Toronto, Ont., spoke to the group on "Canada's Rubber Tree." He described the synthetic plant at Sarnia, Ont., and said that government synthetic rubber manufacturing is a sound commercial proposition in Canada. The process is being developed and operated on a basis that will assure Canada of a permanent supply of synthetic rubber and plastics after the war. Never again can Canada afford to be dependent on sources beyond her control for so vital a commodity as rubber, Mr. Berkinshaw declared. If Canada is going to maintain armed forces, she must maintain this source of supply of synthetic rubber.

Subsequent meetings of the group are scheduled for December 13 and January 12.

Heat Resistant Rubber Has Silicon Base

SILICONE rubber, a recently developed product, is reported to possess many of the physical properties of rubber, but differs materially in its chemical nature from the many synthetic rubbers now available. The basis of the silicone rubber molecule consists of alternate silicon and oxygen atoms with two methyl groups attached to each of the silicon atoms. Thus dimethyl silicone is the building block of which units are joined to form the long-chain polymer. The silicone rubber molecule has no chemical unsaturation. Vulcanization is therefore accomplished by new and unconventional methods. The rubber is handled with standard rubber processing equipment. It may be compounded with filler, and many of the fillers employed in rubber processing are used. Silicone rubber may be extruded in standard continuous extrusion machines. It can be molded and vulcanized in a steam-heated press.

The outstanding characteristic of silicone rubber is that of heat resistance. Reportedly it will retain its elasticity for a long time at 200° C., and temperatures as high as 300° C., for days. It is estimated that silicone rubber may be used at a continuous operating temperature of 150° C., compared with 85° C., for natural or synthetic rubber. The heat stability is said to be derived from the "crossing" of organic and inorganic substances. The silicon-oxygen combination contributes the strong resistance to heat.

Low compression set at high temperatures is claimed to be another advantageous property of silicone rubber. While a cylinder of the material does not return completely to its original position, it does show low compression set. In addition silicone rubber is unaffected by ozone, corona, and ultra-violet light. Future research and development are expected to eliminate its low tensile strength and tear resistance.

Developed entirely apart from the government synthetic rubber program, silicone rubber is now being manufactured in a pilot plant in the resin and insulation materials division of General Electric Co. All of it is going into high-priority war materials such as gaskets and shock-absorbers for the glass of Navy searchlights used to control the fire of guns at night. Future uses are expected to include tires, printing rolls, wire and cable, hose connections, tubing, gloves, bushings, and garden hose. The material has been used for baskets for making tight enclosures on industrial chemical equipment that must operate at high temperatures.

Chlorinated Synthetic Rubber

CHLORINATED ISOPOL, developed from a synthetic rubber formulation, is said to be nearly identical to chlorinated rubber in flame, moisture, and chemical resistance, in solubiilty, stability, and compatibilty with plasticizers. Its use is indicated as a primer for rubber-to-metal adhesion; as an ingredient in adhesives; as an acid and alkali resistant coating; for fire- and moisture-proofing materials; and as a plastic. It is available from the Union Bay State Chemical Co., Cambridge, Mass., in metal primer formulations and in powder form.

Elastic Thermoplastic Hydrocarbon Resins

UNDER the trade name Piccolastic, a series of resin polymers of styrene and its homologs has been introduced. The entire line is soluble in aromatic hydrocarbons. In general the Piccolastic resins are of sufficiently pale color to be suitable for the majority of uses. They are permanently thermoplastic and are stable at temperatures up to 175°C.

At room temperature Piccolastic A-5 is a low viscosity liquid. It is useful as a dissolving plasticizer for Buna S, chlorinated rubber, cyclized rubber, polystyrene, ethyl cellulose, polyvinyl chloride, and polyvinyl acetate. It may be used in relatively small quantities with such resins of high micellular structure to give elastic or tough films, coatings, and molded objects. It is believed that it may impart desirable low-temperature flexibility to a wide variety of compounds.

Piccolastic A-25 is a very viscous liquid at room temperature. It possesses much of the solvent power of the A-5, but in addition may be used in high ratio to high micellular polymers to give sticky, tacky, adhesive-type compounds. It may produce good low-temperature flexibility in elastomeric compounds because of its high solvent power.

Other Piccolastic resins have properties which make them useful for ingredients of adhesive applications, wire and cable insulation, artificial leather, and tank linings. Products of the Pennsylvania Industrial Chemical Corp., Clairton, Pa., these resins are supplied by the Standard Chemical Co., Akron, O.

Novac

AN ULTRA-ACCELERATOR and vulcanizing agent has recently been developed for the purpose of attaining uniform cure, particularly with GR-S, through improved accelerator dispersion. This product, introduced as Novac, is a free-flowing liquid at mill room temperatures and is highly soluble in natural and synthetic rubbers. Its chemical composition is selenium dibutyl dithyocarbamate. Novac may be used alone or in combination with thiazole-type accelerators as a vulcanizing agent or as an accelerator with sulphur. Amounts of from 2% to 5% as curing agent and 0.5% to 1.0% as an accelerator are recommended by the supplier, Herron Bros. & Meyer, 82 Beaver St., New York 5, N. Y. The use of Novac is said to be especially indicated where the accelerator is added on a warm-up mill just prior to extruding or calendering.

Special Report

(*Continued from page* 321)

United Kingdom to pay income tax upon the profits accruing in respect of the production and sale of such rubber. This tax was increased to 5% on February 1, 1941, and continued at this rate until invasion by the Japanese forced the discontinuance of exports early in 1942. This had the effect of further increasing the costs of local companies other than sterling estates.

(To be concluded)

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MANUFACTURER

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UNITED STATES

World Trade Views Revealed at Business Conference; Military Tire Demands Skyrocket

The views of representatives of private industry of 52 nations from many different parts of the world on such subjects as the commercial policy of nations, currency relations, industrialization of new areas, raw materials and foodstuffs, cartels, and private enterprise were expressed at the International Business Conference at the Westchester Country Club, Rye, N. Y., November 10 to 20. Some interesting observations on the subject of production of rubber in the postwar period were obtained by INDIA RUBBER WORLD from Sir Frank Beaurepaire, managing director of Olympic Tire & Rubber Co., Melbourne, Australia, and J. Theodor Cremer, director of Deli Co., located before the war at Sumatra, both of whom were delegates to the conference from their respective countries.

The shortage of heavy-duty tires for both military and civilian uses, aggravated by a very greatly increased demand for military tires for 1945, resulted in an emergency conference in Washington on November 22 between tire company representatives and WPB, WMC, and War and Navy Department officials.

Speculation on the postwar future of synthetic rubber continued active in our leading newspapers and periodicals; increased production of tire cord was reported in spite of a slight, but steady decline in employment by the War Manpower Commission; the War Production Board announced another one-month holiday from industrial alcohol production for grain beverage distillers because of a reduction in the requirements for alcohol for synthetic rubber during the fourth quarter; the necessity of increased safety and health measures in the rubber industry was emphasized by the OWI and by the National Safety Council; and the State Department and the Foreign Economic Administration announced that an FEA mission will be sent to Liberia, with the approval of that government to increase the production of strategic materials such as rubber and palm oils.

World Trade Problems Discussed at International Business Conference

The International Business Conference convened at the Westchester Country Club as the first international conference which was not governmental to come out of the war. Representing organized private business, not world politics, more than 300 delegates from 52 nations sat down together to discuss economic problems. The conference was sponsored by the American Section of the International Chamber of Commerce, the Chamber of Commerce of the United States, the National Associations of Manufacturers, and the National Foreign Trade Council. The invitations were issued within a month after the first Allied troops forced their way on to the Normandy beachhead.

The agenda of the conference consisted of eight major sections: commercial policy of nations, currency relations among nations, encouragement and protection of investments, industrialization in new areas, transportation and communication, raw materials and foodstuffs, cartels, and private enterprise.

The section on raw materials and foodstuffs, under the chairmanship of Sir Frank Beaurepaire, offered a report to the conference in plenary session urging reduction in tariffs and increased industrial utilization of farm products. The report recommended the creation of an international clearing house for information concerning the establishment of standards for materials and semi-processed products of agriculture, mining, fishing, and forestry. This agency would cooperate with trade associations in perfecting grades and standards and would gather, record, and disseminate statistics relating to production and consumption. Declaring that production, processing, and distribution of raw materials should be the responsibility of free enterprise, the report acknowledged that governmental assistance in the fields of research, education, and the collection of statistics provided a foundation upon which a well coordinated economy can be developed by private enterprise. National self-sufficiency policies were condemned. To facilitate the free flow of raw materials in international trade the reopening of all commodity futures markets at the earliest possible date was recommended. The guarantee of free and equal access to raw materials was urged.

The section on cartels was headed by Sir Clive L. Baillieu, of Great Britain, deputy president of the Federation of British Industries and a director of Dunlop Rubber Co., Ltd. The report, accepted without dissent by the plenary session, reflected the English point of view. It revealed the inability of the group to come to a conclusion on the basic issues involved and recommended further study of the subject.

However the report asserted, "It is the sense of this section that it is essential to preserve the benefits of such agreements, and to avoid their use in a manner which is contrary to the public interest of any nation. Further, it is vital to economic cooperation between nations that they reconcile their views and practices in regard to these agreements over as wide an area as possible and establish rules and standards to govern such agreements in international trade."

The report on commercial policy of nations suggested the concluding of a multi-lateral trade convention committing the contracting parties to the progressive lowering of tariffs, the elimination of quotas and import embargoes, the adoption of the most favored nation clause in unconditional and unlimited form in all commercial treaties, abandonment of discriminatory trade practices which lead to closed trading systems, and the elimination of national sales and production monopolies which discriminate against foreign producers. Establishment of an international economic organization to coordinate and supervise these objectives was recommended. The report advised the concluding of treaties of commerce for periods of at least ten years to enable persons engaged in international trade to make long-term provisions for production and marketing. Governments of creditor countries were warned to find ways of increasing imports into their countries so as to enable debtor nations to meet their obligations. The full conference session amended the report by the addition of a statement condemning export subsidies introduced by the delegation from India.

Diversity of opinion on private enterprise between United States and British delegates to the conference was reflected in an addenda to the report, which, as read by John S. Dodd, of the Association of British Chambers of Commerce and vice chairman of the section on private enterprise, noted that the need of developing private enterprise, but asserted that in certain circumstances enterprise must be controlled. The addenda, adopted in plenary session of the whole conference, was prepared by members of the United States delegation. It stated specifically the commitment of that delegation to "competitive enterprise in preference to monopolistic enterprise." The addenda, it was said, reflected United States opposition to the British point of view on cartels.

Large Rubber Production Seen in Early Postwar Period

Production of crude rubber in the Far East can be expected to reach at least the yearly rate of 1,000,000 tons within 18 months after the liberation of Japanese occupied rubber producing areas, Sir Frank Beaurepaire told INDIA RUBBER WORLD. The first six months after the rubber producing areas are freed from enemy domination will be required for reorganization of plantation staffs and facilities and for preparations for resuming production, Sir Frank stated. Some production will be expected, but the quantity in that period is problematical. The next 12 months will show increasing productivity. He pointed out that after a short period of adjustment and preparation in Papua, New Guinea, following liberation of the island, production totaled 1,400 tons of rubber in the first year of resumed work, which was nearly 50% higher than prewar.

Concerning rubber regulation in the postwar period, Sir Frank said that he accepted the view of a tightness in supply for two or three years after the war and that all that period was available for a crystallization of arrangements relating to the future of crude and synthetic rubber.

"I have no doubt that synthetic rubber will remain a marketable product on a large tonnage basis after 1947 or 1948," he said. "I would suggest 250,000 tons a year is not an optimistic figure. Further improvements in quality should result in a sound economic demand on that scale. Failing this it would be logical to arrange with the assistance of the world rubber industry for a protective measure to insure production and consumption of approximately 250,000 tons of American made synthetic rubber annually, the great bulk of the amount being consumed in the United States. Synthetic prices can hardly be expected to be on a competitive basis with crude prices two or three years after the war. It is quite logical, he further declared, to assume that ultimate production costs of synthetic rubber will largely decide its final position in the industry.

He pointed out, however, current predictions concerning the future of synthetic rubber must remain in the nature of guess-work because other factors have an important bearing on the question; for example, the greater value of basic synthetic rubber materials as ingredients of other consumer goods of worldwide demand. But a minimum production of about 200,000 tons of synthetic rubber a year will no doubt remain a requirement for military security, Sir Frank asserted. A large-scale research and development program in production and usages must also remain a part of such a program.

A gradual increase in the consumption of rubber is expected in countries which previously have not had a notable consumption, the Australian stated, but postwar demands will be extremely heavy for several years from those countries which in the past have been the predominant market.

At no time during the discussions of the raw materials section of the International Business Conference was rubber debated. When the question was raised, Sir Frank assured those present that the liaison between the United States, the British, and the Dutch was of such a character that no fear need be felt about a proper distribution of rubber and rubber-like materials. The section accepted his assurances, and rubber as a specific raw material was not further referred to.

Netherlands Rubber Planter Sees New Methods Used in Far East Rubber Production

A new era in rubber production in the postwar period was forecast by Mr. Cremer. Guided by intensive research in the producing areas and promoted by close cooperation between producers, consumers, and government, crude rubber production in the Far East is expected to achieve results unknown in prewar years. Organization of the industry will be entirely different and methods of production will replace those formerly used, Mr. Cremer asserted.

Of necessity, plantations will produce from high-yielding trees to insure the greatest production per acre at the lowest possible cost, and they will produce the special kinds and grades of rubber that industry will need. To remain competitive such specialization by plantations is necessary, Mr. Cremer pointed out. Native producers will continue to produce smoked sheets and other prewar types, but remilling will be done in central locations to insure standardization in quality. Government assistance for the Indonesian rubber growers will be readily available after the war to help them regain and maintain prewar standards of living. Imports required by the natives, such as cotton, foodstuffs, and other goods can only be had when there is a market for the rubber they grow. This market disappeared under Japanese control.

World capital will be required for financing the rehabilitation and development for intensive production of the plantations as private enterprise, Mr. Cremer stated. He said that the recent London discussions concerning postwar rubber production, in which British, Dutch, and United States industrialists and statesmen participated and which he attended as a member of the Dutch delegation, were of great value from a fact-finding standpoint. The parley indicated that producers and consumers will have to work together to find any methods that will not result in irregular underproduction and overproduction.

"It is up to private enterprise," the Sumatra producer said, "and if private enterprise cannot, governments will have to step in.

"Although I believe that the International Rubber Regulation Control has not been detrimental in the last years before the war and during the war for manufacturers or growers," he continued, I still believe that in the new world we are facing it will not be possible to have unequal representation between producers and consumers in any regulatory scheme.

"It is easy now to say that there must be no restrictions on production, but overproduction in five or ten years' time would be equally bad for consumers and producers."

A large overproduction brings a too-large uncertainty into the lives of the people who live in the producing areas, he explained.

The voice of the native producer will become stronger and stronger, Mr. Cremer predicted.

"We know," he said, "that the areas from which native rubber was produced proved to be much larger than we ever thought."

With government aid, better planting material was given to them before the war. Those trees will be ready for tapping at the war's conclusion, and the better yield will materially increase the native's position. The brightest future for plantations is in areas of concentration, for there the most modern production is possible. Small plantations, as they existed before the war, will find it difficult to reestablish themselves. Because overhead costs are greater than for large plantations, they will have to form groups under a central control or face the alternative in reverting to native production. The Netherlands India Government has been active in the past few months in purchasing equipment through the United States Rubber Development Corp. for native and plantation production. This equipment will give the impetus to immediate production after the war.

A sizable amount of native rubber is expected to be found on the islands at the conclusion of the war, Mr. Cremer said. Some plantation stocks may also be available for shipment. Rubber that is too dirty will not be shipped, he added, but medium grades may comprise the bulk of early cargoes.

Prices for crude rubber cannot be predicted, he declared, until the plantation areas have been inspected to determine what has happened to them during the Japanese occupation. Also the general standard of living on the islands will be an important factor in prices. At any rate it may be assumed that Netherlands India rubber will be on a competitive price basis in the postwar world markets. Because of the tightness in supply following the war no competition with British produced rubber is anticipated in the years necessary to restock the world's depleted rubber market.

Mr. Cremer expressed his admiration for America's development of synthetic rubber to meet the crisis.

"It will in the long run be of benefit to rubber production and consumption for it has stimulated research not only of rubber, but also of rubber uses," he said, "and I expect continued close contact after the war between crude and synthetic rubber development."

CALENDAR

Nov. 20.-Dec. 16.	Sixth War Loan.
Dec. 5.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Dec. 6-8.	National Association of Manufacturers. Annual Congress of American Industry. Waldorf-Astoria Hotel, New York, N. Y.
Dec. 8.	Boston Rubber Group. Christmas Meeting. Hotel Vendome, Boston, Mass.
Dec. 8.	Detroit Rubber & Plastics Group. Christmas Meeting. Detroit-Leland Hotel, Detroit, Mich.
Dec. 13.	Rubber & Plastics Division, Montreal Section, S. C. I. Ritz-Carlton Hotel, Montreal, P. Q., Canada.
Dec. 15.	Chicago Rubber Group. Annual Christmas Party.
Dec. 15.	New York Rubber Group. Christmas Party. Building Trades Club, New York, N. Y.
1945	
Jan. 12.	Rubber & Plastics Division, Montreal Section, S. C. I. Ritz-Carlton Hotel, Montreal, P. Q., Canada.
Feb. 2.	Chicago Rubber Group.
Feb. 6.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.

WPB and Industry Work to Increase Tire Production

As part of the spot production drive to eliminate lags in several vital war production programs, representatives of the procurement agencies, of WPB, and of WMC, headed by WPB Chairman J. A. Krug, visited Cleveland during mid-November for conferences with tire production officials. The *Akron Beacon Journal* reported Mr. Krug as saying that the shortage of military tires presents the most critical supply problem of the war today because the need of tires in the fighting zones has soared far above the supply.

An emergency conference of thirty tire and tube industry officials and representatives of WPB, WMC, and of the War and the Navy Departments was held in Washington on November 22 to restudy industry capacity and obtain new production estimates from every manufacturer. Each company was asked to indicate how much it could increase production; (1) with existing facilities, (2) if provided with more manpower, (3) if provided with ordered, but as yet undelivered new equipment, and (4) if provided with even more new equipment not yet on order. H. G. Batcheller, WPB vice chairman, stated that the WPB would not hesitate to program new tire plants if necessary, but since it takes from nine months to a year before new plants could be in production, he said he hoped this step would not be necessary in view of the time factor.

The present critical situation has developed from the very high requirements for truck and bus tires for the first quar-

ter of 1945, which includes the needs of all claimant agencies and was first set at 6,447,437 tires. This requirement, about 65% above the industry's stated capacity to produce, was screened to 4,941,864 tires, still 25% above present capacity. Military requirements were considerably higher than expected, to a considerable extent because of a greater need of replacements. It was stated that this was not due to poor wearing qualities of the synthetic tires, but to the terrific beating they have been taking on the abnormally bad terrain in Europe and on such surfaces as the coral dust on the Pacific front. It was further revealed that the long Army supply lines in France were wearing out tires at a rate exceeding even the most liberal military estimates.

The general discussion at the Washington conference, the importance of which was indicated by the presence of Bernard M. Baruch, had to do with the variance between company and WMC weekly statements on manpower requirements, means of improving production rates with existing manpower, realistic prospects of improving production time in processing synthetic rubber, improvement in quality of tires to cancel need of increased number of units, effect on production of running all plants seven days a week, 24 hours a day, for the next six months, a review of new machinery production schedules, and means of finding new sources of supply for rubber machinery in order to obtain prompt production from any new expansion program. Since jeeps use tires in passenger car sizes (although the tread design is usually different), it may be that some passenger-car tire manufacturing equipment and labor must be diverted to tires for jeeps. This change may reduce passenger-car tire production somewhat, but the total should not be great or seriously affect the ability of the WPB Rubber Bureau to supply OPA with sufficient passenger-car tires to fill the demand of B and C card drivers, it was said.

Officials of Akron rubber companies summarized the situation after the conference by saying that Mr. Krug's demand for a 25% increase in heavy-duty tire production is the "toughest nut" the rubber industry has been called upon to crack. Lack of skilled manpower, shortages of such critical materials as rayon, nylon, and carbon black, and absenteeism running as high as 10% are the major barriers to further increases in heavy-duty tire production, industry spokesmen revealed. Despite these problems, production now is twice as great as in the best peacetime year. Present production rate is just under 4,000,000 tires per quarter, but the industry promised Mr. Krug that somewhat in excess of that figure would be produced in the first quarter of 1945. A spokesman for the United States Rubber Co. in New York confirmed the Akron viewpoint and added that recent improvements in tire design and production may contribute in the effort to reach the new production quotas.

Fress Comment on Postwar Rubber Problems

An Associated Press feature article emphasizing the view that an oversupply of rubber in the postwar is very likely and that as a result synthetic rubber in the United States would seem to require protection of subsidy of some sort appeared in some of the country's leading newspapers during November. The *New York Times* in an editorial on "Synthetic Rubber's Future" indicated that it believed that natural rubber, when available in volume, would dominate the market for automobile tires because of its lower cost and because synthetic rubber is not yet the complete equal of natural rubber for road use. The *New York Daily News* stated editorially that our common sense postwar policy requires that we insure ourselves against ever being cut off again from our rubber sources and added that we can do this by keeping our synthetic rubber industry at least alive enough to start war-scale production in a relatively short time.

Former Rubber Director Bradley Dewey in an article in the *American Magazine* for December predicted that natural rubber would be unable to supply the postwar demand and pointed out that the four big volume synthetic rubbers: Buna S, Buna N, Butyl, and neoprene, can do almost anything that natural rubber can, and often better, except in the large heavy-duty truck and bus tires and in the production of some dipped goods such as surgeons' gloves. He suggested that a fair price for a government 30,000-ton Buna S plant, which cost $18,000,000 to build under wartime conditions, should be about $9,000,000, and that at this price, Buna S could be produced and sold privately at a profit for 14½c a pound. This is the same as the cost of 85% of the plantation rubber used in this country before the present war. Colonel Dewey opposed pampering or subsidizing our synthetic rubber industry, but concluded his article with a plea for a healthy competitive American synthetic rubber industry, to make this country independent in time of peace, and safe in case of war.

Improved Safety and Health Measures Recommended

A report from OWI, prepared from data furnished by the Department of Labor, WMC, and WPB, disclosed considerable loss of production time due to work accidents and illness in 10 critical war industries, including rubber tire manufacture, and emphasized the need of increased safety and health protection measures in order to utilize currently employed manpower to the fullest extent. Average time losses in 1943 per 1,000 workers in rubber tire manufacturing due to disabling work accidents were given as 2,549 days. The Public Health Service figures showed that in 1943 there was an all-industry rate of 138.1 absences per 1,000 workers on account of sickness and non-industrial accidents lasting eight consecutive days or longer, as compared with 106.1 per 1,000 in 1942.

Papers before the thirty-third National Safety Council Congress in Chicago during October dealt with the increased fire hazards in the rubber industry because of the necessity of the use of larger amounts of rubber cements with Buna S and the need of new safety devices on rubber mills because of the large number of new workers using this type of equipment.

Tire Cord and Alcohol Production Up

WMC late in October announced that increased production of tire cord and fabric in the face of a slight, but steady decline in employment was due to improved labor utilization as well as transfer of workers within the plants. August rayon output increased by 2,800,000 pounds to 10,900,000 pounds, and cotton production was increased by 2,000,000 pounds, to 19,100,000 pounds. Nylon production dropped 200,000 pounds, to a total of 600,000 pounds. Employment in 30 tire cord twisting and weaving plants fell off 2% in August to 33,900 workers. An additional 5,500 workers will be required by March, 1945, if present production plans, calling for a monthly output of 31,300,000 pounds by December, are to be realized. Employment in 10 of the principal plants producing high-tenacity rayon yarn totaled 27,425, an increase of 316 over August 1. There is a need of 1,800 additional workers by November 1 and 1,100 more by March 1, 1945, WMC reported.

The nation's grain beverage distillers were notified by WPB on November 10 that their facilities will not be required for making industrial alcohol during January, 1945, because of a reduction in the requirements for alcohol for synthetic rubber during the fourth quarter of 1944. The synthetic rubber plants that produce butadiene from petroleum are now approaching their rated capacities and are no longer restricted to low production rates because the butylenes they use as raw materials are so urgently needed for the production of aviation gasoline.

FEA Mission for Liberia

The State Department and FEA announced during November that an FEA mission will be sent to Liberia, with the approval of that government, for the purpose of assisting Liberia with the problem of increasing the production of rubber, palm oil, etc., and also to develop plans for a seaport to be constructed by a private United States contractor under the supervision of the U. S. Navy's Bureau of Yards and Docks. Development of Liberia's rubber resources was started in 1926 by the Firestone Tire & Rubber Co., whose present production in Liberia amounts to about 20,000 tons a year. New acreage under cultivation will increase this to about 30,000 tons in 1948.

Slower Tire Wear at Night

Results of tests with a small number of S-5, 9.00-20 rayon truck tires run on the Government Tire Test Fleet at San Antonio, Tex., for the purpose of comparing daytime *versus* night operation showed that the tread wear mileage for the tires run during the day is only 86 as against 100 for the tires run at night. The ratio of total inches of tread cracking for the tires run during the daytime was 380 as compared with 100 for the tires operated at night. The average temperature during the day was 84° F., and 75° F. at night. The test results indicate that night operation results in slower wear and less tread cracking than daytime operation.

Buna S Raincoats Effective

Field tests recently completed by the Quartermaster Corps, United States Army, indicated that raincoats prepared with Buna S are as effective as those made with synthetic resin materials for protection from rain, resistance to folding, and ease of repair. As the supply of synthetic rubber increases, it is believed that more rain garments will be made with synthetic rubber because its cost is slightly lower than other currently used materials.

New Pricing Formula for Carbon Black; Other Regulations Revised

A special pricing formula for any additional output of easy-processing channel carbon black produced from existing facilities over and above the monthly average for the first half of 1944 appears in Amendment 183 to Rev. SR 14 of General Maximum Price Regulation. Effective November 8, the new formula is based on approximate total costs to produce the additional (incremental) output and is part of an inter-agency program to stimulate the manufacture of this carbon black urgently needed for the expanding synthetic rubber production.

WPB has inaugurated a program to increase output by reopening closed-down portions of existing plants; moving equipment from old plants to locations where natural gas is available; building new plants, either by private or by DPC financing; and by furnishing additional supplies of natural gas.

The principal material cost in EPC carbon black is the natural gas burned to produce it. Most of the current production obtains gas under long-term contracts at a price that allows production under existing ceilings. The gas cost for most of the additional output, however, will be substantially higher, and production under present ceilings will not be possible without incurring loss. Besides the higher gas costs, some new and reopened plants may have shorter economic life than those already in operation. This will mean a higher depreciation rate to be charged against production costs in those cases where OPA finds such higher depreciation justified.

Prices established under the new formula for the additional output will be based on its approximate total production costs. Since these costs will vary substantially between the different new facilities, prices will be established separately for each one. The individual prices will be based on actual operations during a given period and apply to an amount of EPC carbon black equal to the amount of incremental output produced during the period.

Until the result of actual operations is available, the producer will be permitted to sell at an estimated price. As soon as the report of actual operations is available, the estimated prices are to be adjusted accordingly, and any excess payments received must be refunded. OPA will review reported prices and make such adjustments as are found necessary. Except for the specified initial period of operation, prices will be reviewed and adjusted monthly for the incremental output. If after experience under this program it develops that there is sufficient stability in the costs of operation to permit such action, specific ceilings for incremental output at each new facility may be established.

The maximum price per pound for bulk sales will be based on the sum of the following total costs per pound: gas costs, including treatment and delivery; amortization of expenses of renovating closed plants, depreciation; DPC rentals, if any; direct labor costs; other manufacturing costs; and selling and administrative expenses (based on the average cost per pound for this item for the producer's entire production of easy-processing channel carbon black at all plants during the first six months of 1944).

All incremental output of the commodity will be handled through Defense Supplies Corp. to minimize marketing difficulties caused by the variation in maximum prices for the same commodity. DSC will buy at the price established by Amendment 183 for each incremental producer and sell at the weighted average cost of acquisition.

Defense Supplies Corp. sales of incremental output of easy processing channel carbon black are exempt from price control, by Amendment 85 to Rev. Supp. Reg. No. 1 to the General Maximum Price Regulations, effective November 25.

Manufacturers will be given individual prices by OPA for the incremental output with the prices representing approximate total costs of production. These prices will vary from plant to plant and are expected to be higher than the established prices for normal output, as a result, generally, of the necessity of using higher priced natural gas for the additional production. All the incremental output will be bought by DSC and distributed by it at weighted average acquisition cost. Since the corporation will pool the supply, and sell at an average flat price to industrial users, exempting the incremental sales by that agency from price control will have no effect on the general level of prices, OPA said.

Changes in OPA Footwear Orders

Shoes made with the new non-marking synthetic rubber soles, to appear on the market soon, must be priced as new items, according to Order 13 under Section 1499.3 (e) (3) of the General Maximum Price Regulation, effective November 4. But new ceilings on these soles and heels are being prepared by the OPA's Rubber Branch. While shoes with these new non-marking soles are not to be considered similar for pricing purposes, this does not apply to the mere substitution of a synthetic non-marking rubber heel for the so-called carbon black rubber heels now in use. Such a substitution of heels does not make the shoes dissimilar, OPA said, and therefore does not justify any change in the maximum price. Order 13 was adopted because the great bulk of non-marking synthetic rubber-soled shoes will differ from shoes now in production only because of a change in the sole or sole and heel. The order establishes a simple method of determining maximum prices for such shoes and, at the same time, relieves OPA of the administrative burden of processing reports and applications required by Section 1499.3. Maximum prices for sales of footwear with non-marking synthetic rubber soles by sellers not covered by Order 13 will be determined under the applicable provisions of Section 1499.3 of GMPR.

Non-marking rubber heels and soles have not been manufactured since shortly after Pearl Harbor. They were then made from natural and reclaimed rubber. Resumption of production has now been authorized by WPB. They will now be made from synthetic rubber.

Ceilings for brown and black non-marking synthetic rubber heels and soles on sales to shoe manufacturers were established in Amendment 9 to MPR 477—Sales of Rubber Heels and Soles in the Shoe Factory and Home Replacement Trades—effective November 3. Sales covered by Amendment 9 are of heels and soles made by manufacturers of these items and sold to shoe manufacturers for use on new shoes. Ceilings will be established later on sales of non-marking synthetic rubber heels and soles for sales in the shoe repair and home replacement trades.

The new ceilings, in dollars and cents on all standard items, are approximately 20% higher than the 1941 prices for comparable non-marking heels and soles made from natural and reclaimed rubber and sold to shoe manufacturers. Manufacturers had requested prices 45% above the 1941 level, but a study of estimated costs and consideration of the overall financial position of the industry indicated that a 20% rise over the 1941 level for the natural and reclaimed rubber items would result in maximum prices generally fair and equitable. These prices cover factory costs of the bulk of production. OPA said that the ceilings now established are not intended to be permanent, and that additional cost studies, based upon actual manufacturing experience will be made. The ceilings then will be revised if necessary.

The new ceilings are embodied in 16 groups covering the various types of heels and soles produced. They are similar to the groups for which ceilings already are established on carbon black rubber heels and soles, the only types manufactured since shortly after Pearl Harbor.

OPA consulted both with the Rubber Heel and Sole Industry Advisory Committee and with the industry in general before adopting Amendment 9.

Amendment 82 to RO 17—Shoes—effective November 6, makes ration-free shoes made in this country, or imported, before November 6 that contain no leather except for small quantities reenforcing fabric uppers. Included are present stocks of rubber-soled gymnasium shoes with canvas uppers that have leather reenforcements, as around eyelets, ankles, or heel seams.

Tire Industry Revisions

Revocation of a differential on synthetic rubber original equipment tires in rayon construction above the ceilings for tires of the usual cotton construction appears in Amendment 2 to RMPR 119—Original Equipment Tires and Tubes—effective November 11. There is no longer any general need of this differential, OPA said, pointing out that, on the basis of reductions in the costs of rayon construction tires, and after consultation with OPA, practically all manufacturers originally applying for rayon differentials have already amended their applications to eliminate them. The differential, applied to manufacturers' ceilings, was an amount not exceeding the difference in factory costs of tires in rayon construction compared with tires in cotton construction. Amendment 2 leaves maximum prices identical for synthetic rubber original equipment tires made either in rayon or cotton construction. The differential for rayon construction tires had been allowed since April 13, 1944, when it was represented by the industry that the costs of these tires would be considerably higher for manufacturers who had had no previous experience with this material and who did not have their own or conveniently located facilities for the neces-

sary spinning, weaving, and dipping. A study of cost data has shown that the basis for a differential has been eliminated through reductions in the costs of spinning and weaving, lower labor costs due to greater experience with rayon, some reduction in freight resulting from combined operations at one location, improvements in construction, and other factors. OPA pointed out that should any individual manufacturer find that his costs, including his rayon costs, are such as to impede or threaten production of original equipment tires essential to the war program, he may file an application for adjustment of his maximum prices.

Order 17 to MPR 528—Tires, Tubes, Recapping, and Repairing—effective November 2, establishes the retail ceiling for a new amphibious marsh buggy tire and tube made by the Goodyear Tire & Rubber Co., Akron, O. Order 18 (November 6) sets retail ceilings for certain new industrial solid tires carrying the brand name of Goodyear Supply Co., Inc., Philadelphia, Pa.

Amendment 89 to RO 1A—Tires, Tubes, Recapping, and Camelback—cancels, effective November 22, the requirement that local rationing boards post a weekly list of applicants granted certificates for new tires; such names, however, are now available on request. The amendment also provides for issuance of a certificate for a tractor-implement tire to be used on a passenger car in order to provide for the tire needs of passenger automobiles rebuilt to operate in deep mud and snow. Besides the Rubber Development Corp. is permitted to transfer passenger tires that it imports to any agency of the United States Government without the exchange of tire certificates. Amendment 89 also clarifies the provisions under which a tire manufacturer may transfer truck tires to a dealer without obtaining replenishment portions of tire rationing certificates to cover the transfer.

Amendment 13, RO 1E—Mileage Rationing: Tire Regulations for the Territory of Hawaii—effective November 1, revises regulations on the transfer and use of non-rationed tires and tubes and tightens rules relating to the issuance of certificates for recapping, for truck, tractor, or implement tires, or for tubes.

Amendments 2 and 3, RO 1F—Tire Rationing Regulations for the Territory of Alaska—both effective November 1, extend eligibility for specified tires to authorized public carriers and certain commercial motor vehicles operating in the interests of public health.

The November quota of new automobile tires allocated by the WPB was 1,850,000, 250,000 more than the October quota.

"As near as we can tell, this quota should satisfy normal November replacement needs of eligible 'B' and 'C' ration holders," Max McCullough, Deputy OPA Administrator for Rationing, said. "In addition, the quota is large enough to enable local boards to work off a few of the estimated back log of 850,000 approved, but unfilled, applications for new tires. To clean up these unfilled applications promptly will take a monthly quota of at least 2,000,000 tires. The facts, therefore, indicate that the November increases in quota cannot be interpreted as an indication that the tire emergency for passenger-car owners is nearing an end. On the contrary, they again make it clear that recapping will still be necessary for most motorists if they are to keep their cars in operation.

Type of Tire	Quotas Allocated	Reserves	Total Quota	October Quota
Passenger & Motorcycle				
Grade I (new tires)	1,728,095	121,905	1,850,000	1,600,000
Truck and Bus				
Size 7.50 and smaller	259,939	20,061	280,000	315,000*
8.25 and larger	88,770	21,230	110,000	105,000
Tractor-Implement				
Size 7.50 and smaller	36,800	13,200	50,000	60,000
Larger than 7.50	13,800	6,200	20,000	23,000

* A supplemental quota of 35,000 small truck-bus tires was authorized for October after the original quotas were announced.

"Any broadening of eligibility requirements—that is, to enable 'A' ration holders to buy new tires—must wait on three conditions:

"(1) Elimination of the present backlog of 850,000 approved, but unfilled, tire applications of eligible 'B' and 'C' ration holders.

"(2) An increase in the stocks of new tires in the hands of dealers and distributers to a level of four to five million. (As of September 30, estimated inventories were at the 2,800,000 level, with compilation of September inventories not yet completed.)

"(3) That the monthly rate of production be sufficiently in excess of 'B' and 'C' requirements at that time to permit quotas to satisfy a very substantial part of the 'A' demand, beginning with the first month of liberalization. Otherwise, the demand for passenger tires might be so great that many essential users would be denied while non-essential users received tires."

"The truck-bus and tractor-implement tire quotas for November, with one exception, were substantially the same as for October.

Shown above is a tabulation of November quotas and reserves by tire types (October figures are also shown for purposes of comparison).

Changes in Other Rulings

Manufacturers of certain molded and extruded mechanical rubber goods have been provided with a general procedure for adjusting their own maximum prices when the goods are made from Buna S, according to Order No. 41, MPR 149—Mechanical Rubber Goods—effective November 18. Heretofore no change except in individual cases was permitted in ceilings for these goods because of the substitution of Buna S for natural rubber. Products affected by this order are used for the most part in the manufacture of industrial machinery and consumer durable goods, such as automobiles, refrigerators, etc. They are specifically defined as those goods for which the manufacturer had a regularly quoted price in effect on January 5, 1942, and in the production of which Buna S has been substituted for natural rubber.

Authority for any manufacturer to increase his ceilings for these products up to a specified limit has been granted as the result of a study showing that the maximum prices for a large percentage of these items are below current manufacturing costs; that at this level of prices production is impeded or threatened, and that many applications for higher prices by individual manufacturers would be made.

The authority limits the increase that a manufacturer may obtain to the minimum adjustment that would be granted by OPA on an individual application. This limitation is equal to current factory costs, plus cash discount. Detailed instructions are given for calculation of the new maximum price, which has to be reported to OPA at least ten days before it is put into effect. In all cases of a recomputed maximum price, there must be a redetermination of the maximum price between 60 and 75 days after the manufacturer begins production or sales of the commodity at the adjusted price. The redetermined price must also be reported to OPA at least ten days before it is put into effect.

Order 2886, MPR 188, effective November 16, sets ceilings for Buna S Swim-Fins made by Huntington Rubber Co., Los Angeles, Calif.

The ceiling price of ester gum made wholly from gum rosin has been upped ¼c a pound to compensate for the increase of 24c per 100 pounds in the price of gum rosin granted by OPA October 11, pursuant to a directive of the Economic Stabilization Director. (Amendment 6 to MPR 406—Synthetic Resins and Plastic Materials and Substitute Rubber—effective November 11, also increases slightly the price of ester gum made from both gum and wood rosin and provides a simplified formula for pricing solutions or mixtures of ester gum with other materials.

Supplementary Order M-317A—Cotton Fabric Preference Ratings and Restrictions—was amended October 23. Preference rating AA-2X has been assigned to the processor, merchant, and user of certain cotton textiles used for specified products, including: coated abrasive products; safety equipment under L-114; adhesive tape; plasters; rubber gloves under R-1; safety and industrial rubber hose and tubing; mechanical goods under R-1; chafer fabrics, flippers, head wraps, liner and wrapper fabrics for tires and other rubber products; varnished cambric cloth and Holland cloth for the rubber industry; insulating, cable wrapping, friction, and pressure-sensitive tape; varnished cambric for camelback. Preference rating AA-3 has been assigned to, among others, certain processors and users of textiles for men's and boys' black rubberized raincoats and for rubber footwear under R-1; while preference rating AA-5 has been assigned to, among others, processors and users of coated fabrics for export or for infants' waterproof panties, crib sheets and mattresses, bathinettes, water repellant sheeting for beds.

Amendment 97 to MPR 373, issued November 9, but retroactive to June 14, 1944, covers maximum prices for new and used tires and tubes, recapping, and repairing in the Territory of Hawaii.

Amendment 100 (November 1) makes further changes in the prices of these products and services.

Amendment 102, among other revisions, makes additions to tables of retail multiplication figures covering such items as rainwear, brassieres, foundation garments, garters, and suspenders.

Report on OPA Committees

OPA officials met in Washington, D. C., October 31 with members of the Scrap Rubber Repair Materials Industry Advisory Committee. Consultations were on basic price levels at the manufacturing level, relation of prices for different sizes, minimum quality specifications, definitions of different types of sellers, transportation provisions, and identification of merchandise by manufacturer. The committee also elected officers as follows: chairman, A. Warsaw, Vulcanizers Material Co., Grand Rapids, Mich.; vice chairman, Nathan Lakin, A. Lakin & Sons, Inc., Chicago, Ill.; and secretary-treasurer, Harry Lowenstein, Alligator Rubber Products Co., Newark, N. J., who, however, since he is not a member of the committee, has no voting power.

Following its policy of consulting with the industry affected when new maximum prices are contemplated, OPA held meetings in New York, N. Y., on November 2 and 3 with industry representatives in connection with proposed ceilings for tire boots, patches, and reliners made from scrap tires. Consulted were representatives of jobbers and wholesalers of these repair items, of mass distributers, as chains and auto accessory firms, and of dealers, retailers, vulcanizers, and repairmen generally. Among the questions taken up were size groupings, transportation provisions, minimum quality specifications, definitions, margins, and separate charges for inserting patches, boots, and reliners into the tires. A. F. Schalk, Jr., assistant head of the Tire Price Section, and George Abrams, commodity specialist in charge of repair materials made from scrap rubber, both of OPA's Rubber Price Branch in Washington, presided at the New York meetings. Previously similar meetings had been held in Chicago.

Consolidation of the Fuel Rationing and Automotive Supply Rationing divisions was announced November 4. The new division, known as the Fuel and Automotive Rationing Division, has five branches, including one for tires, with John C. Mann its chief.

Rubber Restrictions Eased

R-1 has been reprinted, as amended November 9, with various amendments incorporated. More important of the new changes follow:

1. Neoprene types of synthetic rubber have been removed from allocation control and may now be consumed without limitation as to amount in any permitted product. In addition one type of neoprene synthetic rubber, GR-M, has been made subject to spot authorization by WPB field offices for non-permitted products. (Authorization will not be granted if production in any way interferes with war production or the production of essential civilian articles, WPB said. Labor and facilities to manufacture must be available to the applicant and not required for more essential purposes, it was emphasized.)

2. Veteran's Administration requirements have been included in exceptions previously limited to the Army, Navy, and the United States Maritime Commission.

3. Some special military items have been added to the permitted product list, including sponge mattresses and cushions for aircraft and submarine use, breathing bags for submarine lung and oxygen breathing apparatus.

4. Consumption of Butyl is now permitted in the manufacture of truck and bus tubes, size 8.25-16 through 9.00-24 inclusive, for both government and civilian orders.

Other changes of a technical nature also were made in the basic rubber conservation measure.

Appendix III to R-1 was amended again on November 16. Among the several changes are those affecting delivery of hydraulic hose; certification for resale of rubber gloves and for all purchases of certain miscellaneous rubber products; manufacture of tires, tubes, and airborne life rafts; and GR-I plant clean-up material.

Conservation Order M-174—Elastic Fabrics, Knitted, Woven, or Braided—was revoked November 2 because stocks of elastic fabrics frozen under the order are no longer needed for military requirements.

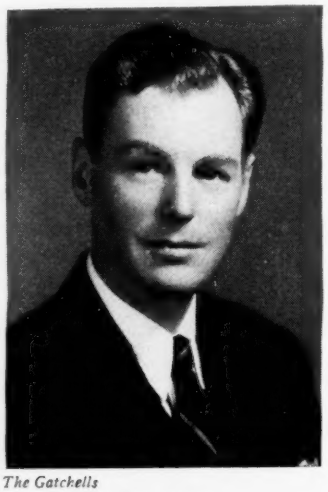
WPB on November 15 issued a suspension order prohibiting Holstein Rubber Products Co., Inc., of 53 High St., Hartford, Conn., from consuming any rubber, including reclaimed and scrap rubber to make any product, unless specifically authorized, until next March 16. According to WPB, the respondent company used a substantial amount of scrap rubber between September, 1942, and last April in the manufacture of church kneelers in violation of M-15-b and R-1. The responsible officers of the corporation knew enough of the restrictions of these orders to make the violations of M-15-b at least grossly negligent, and the later violations of R-1 wilful, WPB alleged.

Limitation Order M-353, as Amended November 4, 1944, cancels all ratings on non-military orders for white pigments, and only those orders accompanied by a military certification are valid rated orders. This action was adopted to expedite military deliveries and to place non-military orders on a more equitable basis.

Limitation Order L-57—Gas Masks and Anti-Gas Devices—was revoked November 1.

The following orders have been revoked and their respective products put under General Allocation Order M-300—Chemicals: M-18-b—Primary Chromium Chemicals; M-183—Phosphate Plasticizers; M-203—Phthalate Plasticizers; M-159—Buytl Alcohol and Butyl Acetate; M-169—Methyl Ethyl Ketone; M-214—Phthalics Anhydride, Maleic Anhydride, and Maleic Acid; M-175—Ethyl Cellulose; M-31—Methyl Alcohol; M-30—Ethyl Alcohol; M-365—Pine Oil; M-257, Sulphuric Acid.

WPB announced November 19 that plans have been completed for the early creation of twelve new labor advisory committees besides the 19 already functionng, thereby assuring labor more extensive participation in advising how to expand war production and in post "Victory-in-Europe" Day reconversion proposals. Among the new committees scheduled is one representing the rubber products field.



The Gatchells

Griffith F. Oliver

I. B. Kleinert Rubber Co., 485 Fifth Ave., New York, N. Y., last month at the Hotel Pennsylvania in New York held its first national sales convention in three years. Problems of wartime selling were considered.

Oliver Tire & Rubber Co. Oakland, Calif., is in the midst of an extensive program of development and expansion that includes the addition of a new division of factory operation, as well as acquisition of additional property, according to Griffith F. Oliver, president. The new property, to be used for storage of raw materials, warehousing, and additional manufacturing, is only 1½ miles from the main plant. Improvements at present include buildings covering 10,000 square feet, and a loading platform of 1,900 square feet. Occupancy will take place as soon as the most needed improvements are completed. Application for a five-spur track has been approved, and the work of installation begun. The remaining portion of the property will be used for the construction of a new manufacturing plant. No definite dates have been established, but the entire program will progress as rapidly as conditions permit.

In the meantime the main plant is not only producing a capacity output of tire repair materials, but a complete new mechanical rubber goods division has been added for the manufacture of precision rubber assembly parts for other manufacturers. Items such as valve parts, packings, diaphragms, and grommets are being made. According to Mr. Oliver, this mechanical rubber goods division is more than a wartime conversion; it has become an integral part of the factory organization in its postwar program. Since 1912 and up to the early stages of the war, the Oliver company engaged largely in the manufacture of camelback and other materials for the tire repairing, recapping, and retreading industry.

EASTERN AND SOUTHERN

Hercules Powder Explains Products to Press

The development, production, and present and possible future use of the products of the several divisions of Hercules Powder Co. were explained to about 40 representatives of the technical and trade press in a two-day conference at the home office and research laboratories of the company at Wilmington, Del., October 26 and 27. Headquarters was the Hotel Du Pont in Wilmington, and Theodore Marvin, director of advertising for Hercules, assisted by his staff and many members of the company's sales, technical service, and research staff, was in charge of the program, which included visits to the Experiment Station and a dinner at the Wilmington Country Club, at which Charles A. Higgins, Hercules president, explained the growth of his company and the development of products now used by more than 50 industries.

After registration and luncheon at the hotel and a showing of the sound film "Hercules Land" on Thursday, October 26, the guests were taken by bus to the Experiment Station, several miles outside of Wilmington, where they were shown one of the general chemical research laboratories, the physics laboratory, and a demonstration of the electron microscope, the rubber, plastics, and paper laboratories, the distillation and fractionation laboratory, the high-pressure laboratory, the synthetic resin pilot plant, and even a demonstration of explosives testing. Some of this part of the program had to be carried over until the next morning, since as part of the return trip to the hotel on Thursday afternoon a stop was made in Wilmington at the soils laboratory for a demonstration of the use of Stabinol, a chemical means of waterproofing soil so that it will maintain its strength and shape when used in construction and road-building work.

In the rubber laboratory the methods of testing the various rosins, hydrogenated rosin, Staybelite and its esters, polymerized rosin, Poly-Pale Resin, etc., for use in GR-S and other synthetic rubbers were explained. The advantages of Staybelite and its esters for formulating adhesive compositions for surgical and other tapes were emphasized. As part of the discussion on plastics, the use of Hercules ethyl cellulose as a packaging material to protect metal parts from corrosion was demonstrated. This packaging method, called "plastic peel," involves the dipping of the metal parts into a special formulation of the molten plastic, after which upon cooling the part is effectively covered with a strong, moisture resistant film that can be easily removed to recover the part when required.

A new chemical, hydroabietyl alcohol, recently introduced by Hercules, which should be of interest to the rubber industry as a plasticizer or as a basis for preparing further deratives of the original material, was exhibited and discussed. By combination with any one of a variety of mono- or polybasic acids, resin esters with a wide range of physical properties according to the acid used, may be obtained from the material.

Following luncheon at the Experiment Station on Friday, interviews were arranged for any of the editors who wished to discuss in more detail any of the products, processes, or equipment they had seen and in which they had become specially interested during the conference. Some of the visitors enjoyed the use of the golf course at the Station during the afternoon.

Dinner for the guests and company representatives was served at the Hotel Du Pont on Friday evening; after which some of the editors attended a presentation of "The Mikado" at the Wilmington Playhouse; while others joined with Hercules employes in celebrating Hallowe'en at a dance at the Hercules Country Club.

Of special interest during the conference was the story of the development of the Hercules Powder Co., founded in 1913 as a manufacturer of explosives, as told by President Higgins at the dinner Thursday evening. Hercules' first step toward diversification was in the production of various cellulose derivatives, which now include cellulose acetate, ethyl and methyl cellulose in addition to the early explosives ingredient, nitrocellulose. Following this, Hercules entered the naval stores field and now is one of the world's largest single producers of these products. From turpentine was developed a group of terpene solvents and chemicals, of which Solvenol and Dipentene are probably best known to the rubber industry. From rosin a whole family of modified rosins, rosin specialties, rosin esters, and synthetic resins has been evolved. A synthetics department was organized in 1936 for the production of special rosin esters and special resins. Special chemicals not related to cellulose, naval stores, or explosives, such as Parlon (chlorinated rubber), Clorafin (chlorinated paraffin), and Stabinol (a resin-base compound mentioned previously for soil treatment) have also been developed.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that E. S. Nickerson, assistant division manager and director of sales of the fabrics division, has relinquished his sales responsibilities in order to devote his entire time to managerial duties. M. N. Nickowitz, previously Fairfield products sales manager, will become director of sales, succeeding Mr. Nickerson. J. R. Owens, serving as special assistant to the director of sales, succeeds Mr. Nickowitz. The products included in Mr. Owens' new sales activities are fabrics coated with synthetic rubber and resins, manufactured at the Fairfield, Conn., plant, and "Texon" saturated fiber base material made at Russell, Mass.

F. H. Weismuller, production manager, has been appointed director of sales of the du Pont pigments department, succeeding John F. Daley, recently made general manager of the department. R. A. Kaiser, assistant production manager, succeeds Mr. Weismuller and is in turn succeeded by C. E. Rossee, manager of the Baltimore, Md., pigments plant. C. E. Smith, in charge of silica gel operations at the Newark, N. J., plant, succeeds Mr. Rossee.

Rubber Trade Association of New York, Inc., 15 William St., New York 5, N. Y., on November 9 held its annual meeting at which the following directors were elected: (one year) Wm. T. Baird, R. S. Hamilton, and Louis V. Keeler, (two years) J. Louis, Herbert E. Meyer, and Fred Pusinelli, and (three years) Jacobus F. Frank, A. L. Grant, and G. Le Roy Scheinler. Named to the 1945 nominating committee were Paul Elbogen, G. Gausman, and F. Lester Kittle. Then at the board meeting Mr. Scheinler was unanimously reelected chairman and Mr. Frank treasurer. B. G. Davy was reappointed secretary of the Association; while R. D. Young continues as its president.

Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y., has appointed Gerald J. Leuck director of research. Dr. Leuck, who received his Ph.D. at Northwestern University, was formerly with The Miner Laboratories, Chicago, Ill., where he did considerable work on carbohydrates and their derivatives, proteins, polymers, adhesives, etc. Prior to this connection he did post-doctorate work under Von Auvers at the University of Marburg, Germany, under Moureu at the College of France, Paris, and under Mark at the University of Vienna. In his new position he will complete and extend the postwar problems instituted by the Glyco company and will form a new research and development laboratory, staffed by chemists with extended experience in the paper, leather, textile, rubber, paint, and plastics industries.

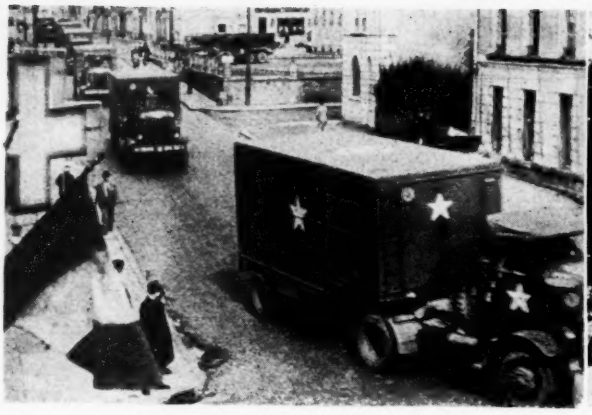
Binney & Smith Co., 41 E. 42nd St., New York, N. Y., recently announced the organization of The Binney & Smith Co. "25 Year Club." Enrolled as members were 58 employes of the firm, representing chapters in New York and Easton, Pa. Included in the membership is John Stead, a vice president of the company, who has been with the firm 40 years.

The Thermoid Co., Trenton, N. J., reported consolidated sales for October at $1,489,434, contrasted with $1,811,643 for October, 1943. The decline was mainly due to a shorter work month and an acute labor shortage. Sales for the first ten months this year totaled $18,100,560, against $17,555,937 in the '43 months.

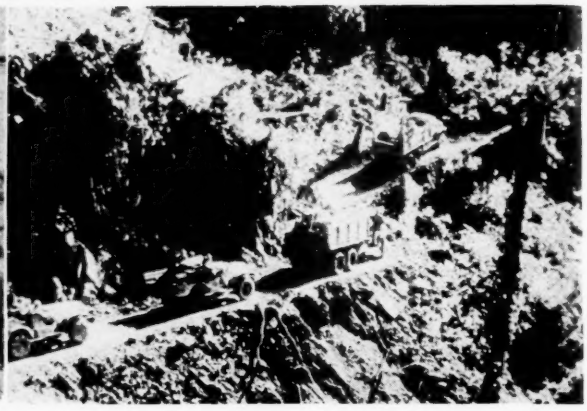
On December 15, Thermoid is redeeming 65 $1,000 4½% First Mortgage Bonds due October 15, 1958, at 106% of the principal amount plus interest accrued on the principal to December 15, 1944.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., has announced plans for a $700,000 addition to its production facilities at its Mt. Vernon, O., window glass plant.

General Chemical Co., 40 Rector St., New York, N. Y., a subsidiary of Allied Chemical & Dye Corp., has announced the construction of a $1,000,000 sulphuric acid plant at Front Royal, Va. Production units will occupy a ten-acre area. The plant is a Defense Plant Corp. facility. Most of the sulphuric acid produced will go to the nearby American Viscose Corp. for the manufacture of rayon used in tire cord and other essential products.



The "Red Ball Express" in France



The "Red Ball Express" on the India-Burma Front

War Department Film for Tire Industry Workers

The War Department released late in November a special motion picture feature dealing primarily with the part heavy-duty tires are playing on the world-wide battle fronts. This film, entitled "Highballing to Victory," draws upon some dramatic combat footage to show tires of every description in the performance of their wartime role. One sequence of the picture, a part of which is shown in one of the accompanying illustrations, portrays the "Red Ball Express" in operation from the beaches of Normandy and extending past Paris for hundreds of miles into the front lines of the German battlefield. There is also the Chinese "Red Ball Express," as shown in the other illustration, and in the film American-made trucks and tires are seen on the Ledo Road, the new vital connecting link on the India-Burma front, delivering guns, food, and ammunition to a territory twice the size of Germany, France, and Italy combined, a territory that up to now had been almost exclusively supplied by air. Scenes of some of the violent crash landings made by our fliers are used to illustrate the persistent need of tire replacements in the Air Corps.

The film, which runs for about 20 minutes, is available in both 35 mm. and 16 mm. sizes and is a sound film suitable for showing during lunch hours, between shifts, or at any other time in the tire plants or in other war industries or contributing activities. Its purpose is to prove to the men and women of war industry how the products they make get there—and get there on time—and as such should be used promptly and often to combat absenteeism, aid production, and build morale among war industry workers. The film may be obtained without charge from the Motion Picture Branch, Industrial Services Division, War Department Bureau of Public Relations, Room 1315, 1501 Broadway, New York 18, N. Y.

Office of Defense Transportation, Washington, D. C., partially suspended the provisions of General Order ODT No. 14, which has prohibited automotive racing in the United States since July 31, 1942. The suspension order applies only to motor vehicles using fuel or tires not subject to federal allocation or rationing regulations. ODT explained that certain vehicles, such as English-type motorcycles and midget automobiles, can be powered by non-rationed industrial alcohols or non-rationed petroleum derivatives. Tires for some of these vehicles are also available in limited amounts from prewar stocks, which have not been rationed since they are of special types not suitable for ordinary usage. The suspension order, ODT 14-1, is effective as of November 8.

U. S. Rubber News

Reconverted from munitions back to tire production in less than a year, the Gillette tire plant of U. S. Rubber at Eau Claire, Wis., resumed tire production and on October 21 produced the first tire, a synthetic rubber truck tire. This huge plant will handle approximately 18,000,000 pounds of rubber materials a month when peak production is attained, in about eight months. Peacetime capacity is set at 14,000 tires a day and 13,000 inner tubes. Prewar production capacity was 10,500 tires daily. Immediate production will be for military and essential civilian use, with emphasis on large-size tires for trucks, buses, and farm equipment. The plant will employ more than 3,300 people, an increase of 33% over prewar employment of 2,431.

While reconversion operations were being carried out at Eau Claire, tire builders and rubber workers formerly employed there were shifted to other U. S. plants in Detroit, Los Angeles, Indianapolis, and Chicopee Falls. These workers are now being gradually called back as Gillette production swings into high gear.

According to President Herbert E. Smith, approximately $19,000,000 of the rubber company's investment of more than $29,000,000 for increased tire output will be spent at the Eau Claire plant. The company will employ 50% more persons in its tire plants in postwar than in prewar days, Mr. Smith added, with a postwar employment for tires alone of 22,000, compared to 14,500 in prewar. The expansion program will increase the company's tire capacity to more than 75,000 units a day, or 24% above prewar capacity, he said, with about four-fifths of this output for passenger-car tires, and the remainder going to make truck, bus, farm, plane, and other large-size tires. He further stated that the company's farm tire production will be centered at Eau Claire with 50% of such production scheduled for the Gillette plant, where truck and bus tires also will be made.

U. S. Rubber's expansion program will be completed and all tire factories operating at new capacity within 10 months, Mr. Smith stated. Eau Claire's expansion will be finished in five months, and capacity reached in eight months, he said, and added that the company's largest tire plant, at Detroit, is geared to capacity output now except for a flotation equipment scheduled for operation in June. These facilities, now used mostly for war, will become available for civilian production as fast as military requirements are lessened or filled.

U. S. Rubber is making a 150-gallon collapsible water tank of synthetic rubber coated duck. It will be used to carry the Army's water supply as troops advance and may be used in the postwar period for transportation of water in tropical areas.

The Metropolitan Alumnae Chapter of Phi Beta presented the National Radio Award to U. S. Rubber, sponsor of the New York Philharmonic Symphony concerts, at a dinner November 1. George M. Tisdale, vice-president of the rubber company, made the acceptance talk.

The sale of a four-story manufacturing building on Cromwell St. and an office building on Sprague St., Providence, R. I., both part of the old Mechanical Fabric division of U. S. Rubber, was revealed recently. These two pieces of property are the last of several parcels sold in April, 1941, after U. S. Rubber had transferred production operations to its other Providence plant in January of that year.

Personnel Mention

Ernest G. Brown, general manager of the U. S. Rubber mechanical goods division, last month announced the appointment of Herman A. Everlien as general sales manager of the division and Walter F. Spoerl as merchandise manager. Both positions are newly created. Mr. Everlien has had more than 41 years' experience in the mechanical rubber goods industry; Mr. Spoerl 36 years. Both men began their rubber careers at early ages as clerks in the sales department of the old Revere Rubber Co. in Chicago, later consolidated into the U. S. Rubber organization. Mr. Everlien became chief

clerk in the Revere office, and in 1913 was made a salesman, responsible for all territory between Chicago and Hastings, Neb. In 1920 he went to Pittsburgh as mechanical goods sales manager and in 1924 was transferred to New York as manager of branch sales, the position he held until appointment to his new post. Mr. Spoerl became chief clerk in Chicago and later assistant manager of that branch. From 1934 until the present promotion he has held an executive sales position in the New York office.

James E. Power has been appointed eastern sales manager of the company's mechanical goods division. He began his rubber career in 1906 as an office boy. Five years later he became a salesman and in 1926 was appointed manager of the New York branch of the mechanical goods division. He interrupted his career during World War I to join the United States Navy, returning to his post in 1919 and later becoming assistant manager of branch sales.

Cyrus S. Ching, director of industrial and public relations of U. S. Rubber, recently was elected chairman of the board of the China-America Council of Commerce & Industry.

Edward M. Polk, 44, assistant branch manager of the Los Angeles office, died at his home, North Hollywood, Calif., and was buried in Calvary Cemetery there, November 3. He leaves a widow and a daughter.

The O'Sullivan Rubber Co., Inc., Winchester, Va., has well under way its $750,000 building expansion program as part of the Defense Plant Corp. plan to increase rubber heel and sole production, in which nine expansions are involved. The new O'Sullivan plant will have an ultimate capacity of 1,200 carloads of soles and heels annually. One wing of the new building is 50 by 130 feet, one story high; the other, 50 by 160 feet, two stories. The rubber company owns the land; while DPC is installing the machinery. Earl Bunting, O'Sullivan president, anticipates for the company even larger volumes of business after the war than at present. Fifty per cent. of current output goes to the government; while the remainder is for civilian trade. Export business after the war is expected to absorb the government's present allotment.

Stanco Distributors, Inc., 26 Broadway, New York 4, N. Y., has opened a new office at First-Central Tower, 106 S. Main St., Akron 8, O., with L. S. Verde district manager.

U. S. Rubber Reclaiming Co., Inc., 500 Fifth Ave., New York 18, N. Y., has appointed Robert Cowen as midwestern sales representative. He will maintain headquarters for the present in the New York office. Mr. Cowen attended Worcester Academy and the University of Maine. He entered the rubber industry in 1916 and has been associated with the Fisk Rubber Co., the Riley Rubber Co., the Appleton Rubber Co., and the Quabaug Rubber Co. For the past eight months he has served as manager of the reclaim and scrap rubber section of the Office of Rubber Director, Washington, D. C.

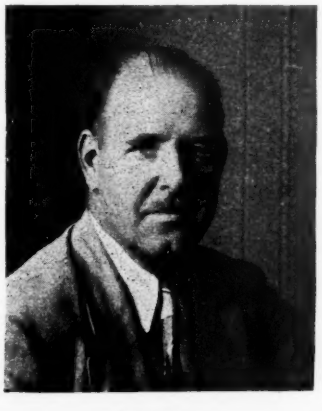
OHIO

Firestone Broadening Field

The Firestone Tire & Rubber Co., Akron, at a special stockholders' meeting October 28 adopted a revised and enlarged purpose clause in the company's charter. This new clause authorizes the company to "make, manufacture, produce, prepare, acquire, develop, experiment with, hold, use, buy, sell, import, export, and trade and deal in rubber, cotton, rayon, plastics, synthetics, chemicals, metals, and petroleum, as well as products made in whole or in part from any of these materials." Chairman John W. Thomas described the action as a forward step in the company's policy of preparing for peace while producing for war. The amendment to the company's charter, he said, places the company in position to take advantage of changing conditions and the experience gained in the development of new products and materials in recent years.

MacGowan Discusses Distribution

In a talk before the Sales Executives Club at the Hotel Roosevelt, New York, N. Y., November 14, T. G. MacGowan, manager of Firestone's marketing research department, declared that distribution improvement has lagged behind product and production improvement because managements were in many cases not distribution-minded, because a pitifully small number of trained people worked on the technique of distribution, and because exceedingly paltry sums, by and large, were spent on distribution research. A special committee of the National Association of Manufacturers found in 1941 that 85% of some 1,231 manufacturers, large and small, did industrial research, as compared with 34% doing marketing research, and the aggregate expenditure for industrial research was 1.1% of sales as compared with 0.025% for marketing research, Mr. MacGowan stated. The speaker, who is also chairman of the marketing committee of the Committee for Economic Development, said that it was his conclusion that not only must the domestic consumption of goods in America be greatly increased in the interest of all, but that it is vital, if the needed increases are to be obtained, that we very markedly step up our study of distribution problems.



Robert Cowen

"If marketing research is applied, distribution can, as it must, meet the challenge which it will face, and play to the full its great part in building an America in which there are jobs and a high mounting living standard for all," Mr. MacGowan concluded.

New Firestone Rim

John W. Thomas, chairman of the board, recently announced production of giant new-type tire rims for military and other off-the-road equipment. Use of the extremely wide, heavy rims permits tires weighted down with loads camparable to those carried by the largest trucks on highways to crawl across muddy field with sureness and ease. Known as "divided rims," they are made in four pieces. The rims are 13 inches wide, 24 inches high, and weigh 315 pounds. A band of metal, called a beadlock, is placed between the inside edges of the tire. Bolting together of the two sections of the rim then causes the tire to be tightly grasped between the metal band and the flanges of the rim. Distribution of the tire's load over the larger space provided by a wide rim helps prevent the tire from sinking into mud or sand. A single wide tire is said to be more efficient on soft ground than dual tires.

Mr. Thomas also announced the development of Veloflex, a leather-like plastic with a vinyl base. Possible uses for the new material include luggage, upholstery, shoe uppers, gloves, clothing, purses and desk tops.

Personnel Activities

Major Raymond C. Firestone has returned to his former position as general manager of the Memphis, Tenn., plant of The Firestone Tire & Rubber Co. Major Firestone was placed on the inactive list of the Air Transport Command, after 2½ years of service, so that he could help speed production of military and essential civilian tires. While in active service, he set up the first rubber conservation unit in the Air Transport Command. He also was rubber conservation officer for the Ferrying Division of the ATC. Among many other innovations, he introduced a program to teach pilots and mechanics proper handling of heavily loaded aircraft to obtain maximum tire life.

C. B. Ryan, Firestone advertising and sales promotion manager, in addressing the Advertising and Sales Promotion Executive Conference at Ohio State University last month, stated that advertising and sales promotion programs must be reconverted now if they are to withstand the terrific stress of postwar merchandising competition.

J. E. Hale, of the Firestone tire division, as a speaker before the New England Motor Carriers' war and postwar conference at the Hotel Statler, Boston, Mass., last month, discussed synthetic rubber truck tires and tubes.

Mr. Thomas recently forecast a civilian demand for at least 70,000,000 passenger tires in the first 12 months after the war. Production emphasis is expected to shift back to civilian tires shortly after the defeat of Germany, Mr. Thomas said, and Firestone's shops will be able to reconvert from military production in 10 days. Production of passenger tires will be near 18,000,000 this year, he added, in contrast to the 33,465,000 replacement passenger tires sold in

1939 and the 45,000,000 needed now or shortly for replacement. The number of tires that can be made for civilians in 1945 cannot be determined until the needs of the Armed Forces have been established. Mr. Thomas pointed to the $75,000,000 expansion program still under way in the rubber industry as one of the most optimistic notes in the civilian tire outlook.

Colombian Tire Factory Nearly Ready

The new tire and tube plant being built near Bogota, Colombia, by the Industria Colombiana de Llantas, S. A. (Colombian Tire Co.), is being rapidly completed and production should start about January 1, announced Stanley W. Caywood, general manager of the international division of The B. F. Goodrich Co., Akron, which is associated in the project, furnishing technical and engineering counsel as well as part of the capital. Capacity of the plant will be around 100,000 tires and tubes annually besides tire repair materials and automotive accessories, Mr. Caywood said. This is about the prewar consumption of the country. The plant is expected to process between 700 and 800 tons of rubber annually. Colombia produces more than that amount within its own borders each year and also grows cotton which may be utilized in tire manufacturing.

Capital of the company is three million Colombian pesos, or about $1,750,000. The plant covers about 100,000 square feet, and the buildings are of single-story construction. It is in an area where power and water facilities are available for industrial development. A housing project is also included. Equipment and machinery have been supplied by United States firms. J. M. Robbins has been named technical representative of B. F. Goodrich and will leave for Bogota soon.

The tire company, of which Antonio Puerto is president, was organized by the Instituto de Fomento Industrial (Society for the Promotion of Industry in Colombia), of which Gabriel Durana Comacho is managing director. Through this agency the Colombian Government provides the original Colombian capital and then eventually disposes of these interests to its nationals. The capital is used as a revolving fund to stimulate Colombian industrial enterprises.

Plans for the tire plant were launched early in 1942 when the Government of Colombia, which depends on highway transportation for its economic welfare because the mountainous terrain has been a barrier to railway development, laid the project before the United States Government, and it was approved by the state and other departments. Arrangements were then made by the Colombian company with Goodrich to collaborate.

Major expansion of plant and manufacturing facilities of Goodrich's Clarksville, Tenn., division was announced recently. An addition of 80 by 400 feet will be erected to house new processing equipment permitting substantial increase in sole and heel production. Besides increasing manufacturing space, the expansion will house a cafeteria, a new employment office, and other facilities. Cost of the Clarksville plant addition and equipment will exceed $500,000, the company estimates. The original Clarkesville plant was completed in 1939. C. R. Spencer is plant manager.

Cheaper Synthetic Rubber Forecast

Waldo Semon, Goodrich director of research, predicted a peacetime price of 10.7c per pound for synthetic rubber at the National Industrial Chemical Conference, Chicago, Ill., November 16. This figure was recently given in a report of the Office of the Rubber Director as were those for current synthetic costs quoted by Dr. Semon.

He stated that, "GR-S is better than the best German synthetic Buna S; easier to mix and handle, easier to build into finished products, and those products give better performance in service." Germany, he said, "was never able to use more than about 50% Buna in tires, whereas the 'S-3' tires on our own cars today contain less than 1% natural rubber."

Because GR-S may not be the best synthetic rubber which could be made for every purpose, Dr. Semon expressed the opinion that in the future there might be one type of synthetic specifically produced for inner tubes, another for coating the cords in tire carcasses, another for sidewalls, and still another for treads.

Personnel News

W. A. Smith has been appointed manager of suspension sales, it was announced by E. F. Tomlinson, general manager of Goodrich's industrial products sales division, which handles all suspension products, including Vibro Insulators, devices of rubber and metal used for isolating vibration and noise. Mr. Smith has been with the company since 1924. He was technical representative in the Washington offices before this recent appointment.

Marcus O. Orr has been named technical superintendent of Mill 4 of the Goodrich company, according to Frank Trockle, general superintendent. Mr. Orr, a graduate of Dennison University with a degree in chemical engineering, has been with the company since 1925.

E. M. Martin, on loan from Goodrich as special assistant to the Administrator of Surplus War Properties Administration and later with the WPB in Washington, is now in Europe on a new government assignment, as a member of the special Anglo-American-French Mission to make recommendations on the restoration of the rubber industry and the re-establishment of civilian transport in France. Mr. Martin was secretary-treasurer of The B. F. Goodrich Co. at Colombes, France, from 1931 to May, 1941. He also returned to France for eight months after the German occupation, returning to this country shortly before we entered the war. With the rubber company since 1920, Mr. Martin was assistant treasurer and later attached to the company's overseas branch of the Goodrich international division, until his services were loaned to the government early this year.

M. N. Burleson has been appointed industrial hygienist at Goodrich, succeeding H. H. Radke, transferred to the chemical division, it is announced by H. E. Fritz, director of research. Mr. Burleson, a graduate of the University of Texas, joined the company last year.

Ralph W. Gordon has been made manager of the Goodrich time study and standards department. He has been with the company since 1936.

Guy Gundaker, Jr., Goodrich field sales manager, addressed the convention of the Association of American Battery Manufacturers at Chicago, November 3, on selling problems of the postwar era.

William A. Moore

Seiberling Rubber Co., Akron 9, has announced several changes in its factory organization, through H. P. Schrank, vice president in charge of production. E. H. Gibbs becomes development manager of the tire division, succeeding Frank Kovacs, who will devote his time to special assignments for the company. Other changes in the engineering and production divisions are geared to the increased production activities of the company. A. A. Leedy is now chief engineer, heading up engineering activities of all divisons of the company. J. R. Keyser was made production superintendent of the milling division, and Harry Cash, production superintendent of the tire division. S. R. Warren will be in charge of all scheduling of all factory divisions.

The DeVilbiss Co., Toledo, has moved its Cincinnati district sales headquarters to larger quarters at 410 American Bldg.

Standard Chemical Co., Akron, has added William A. Moore, formerly vice president and general manager of Armstrong Tire & Rubber Co., Natchez, Miss., to its Akron staff, in charge of technical promotion of sales on all Standard Chemical materials. His experience in synthetic rubber production and training in chemical engineering will be employed to broaden the application of many new materials recently added to the Standard Chemical line, and in collaboration with industries searching for answers to problems arising from new product developments. Mr. Moore, prior to entering business, was an instructor in chemistry at Akron University and served under Dr. H. E. Simmons, now its president. Mr. Moore's work in rubber chemistry attracted recognition, and he was induced to join the laboratory staff of The B. F. Goodrich Co. Next he went to Monsanto Chemical Co., where he served in sales development before joining Armstrong.

New Rubber Derivatives

Among several new products recently developed by The Goodyear Tire & Rubber Co., Inc., Akron, O., is Pliobond, a group of organic cements. This name has been adopted by the company to cover various adhesives. Pliobond R-M, now available after extensive testing, shows excellent results for rubber to metal adhesions. The method of application is, in general, that in common practice. This involves degreasing the metal, followed by pickling or sandblasting, application of Pliobond R-M to the metal surface, application of the rubber after the adhesive has dried, and, finally, the cure. Rubber compounds are given a normal cure. The amount of pressure on the mold during cure is important and should not be less than 1,000 pounds per square inch of platen area for the best results. Reportedly Pliobond R-M is easy to apply, dries rapidly, does not require stirring during application, does not jell, requires no accelerator, and gives uniformly high bond strength without the use of a tie cement. A tie cement, however, is said to show added improvement in the bond. Very strong bonds are said to be obtained with steel, brass, cast iron, aluminum, and stainless steel. At the current state of development, less successful results are obtainable with bronze and magnesium. Tests showed a bond strength for Pliobond R-M of 900 pounds per square inch used in adhesions of Neoprene GN to steel and Chemigum N to steel. Subjected to this tension the failure occurred in the stock. Recorded bond strength for GR-S to steel was 500 pounds per square inch, and natural rubber to steel 550 pounds per square inch. In these two instances failure occurred in both the stock and the bond. These values were increased 400-500 pounds by use of a proper tie cement.

Pliobond M-190-C is a somewhat permanently flexible adhesive developed for bonding rubber to glass, rubber to ceramics, wood to wood, fabric to fabric, fabric to metal, leather to leather, plastics to leather, and other industrial combinations. A tough, flexible bond is produced which is waterproof and resistant to common solvents. It has been successfully used in various applications for equipment needed by the Armed Forces.

Chemigum Type 100 latex is a high-strength concentrated synthetic rubber latex. It is a quick drying, highly stable dispersion of the Buna S type in which the butadiene and styrene are in a 60-40 ratio. As the solids content is about 55% by weight, a gallon contains 4.5 pounds solids. The thermostability of this synthetic latex covers a range of from 40 to 180° F., and its mechanical stability is indicated by the fact that it does not coagulate in 10 minutes when agitated with a high-speed mixer. The rapidity of the drying rate is such that a 0.02-inch thickness is 98% dry in 60 minutes at 212° F. More than 60% of the water evaporates at this temperature in the first ten minutes. The dry film of Chemigum Type 100 is resistant to aliphatic and aromatic hydrocarbons, and its water absorption is said to be extremely low. The latex may be compounded to give 1,350 pounds per square inch tensile and 530% elongation when cured 15 minutes at 270° F. So cured, the tear strength is said to be equal to that of natural rubber similarly compounded. Heavy coats of the synthetic latex applied by successive dipping and drying give a tensile of 3,000 pounds per square inch. The quick drying rate, the high solids content, the stability, and the high tensile of Chemigum Type 100 suggest that it is a major contribution in synthetic latex research and development.

By cyclizing special synthetic rubber copolymers in much the same way that natural rubber was cyclized to make natural Pliolite, the Goodyear company has developed a synthetic material known as Pliolite S-1. This thermoplastic resin is said to be a satisfactory replacement for natural rubber Pliolite in wax combinations and in GR-S wire insulations. In the unmilled or powdered form it has been suggested for use in wax combinations; in the milled and ground form for use in solution coatings and in masterbatches with GR-S for incorporation into synthetic rubber compounds.

Kansas Plant Expanding

Defense Plant Corp. has authorized an increase in its contract with Goodyear Tire & Rubber Co. of Kansas, Inc., Akron, in the amount of approximately $1,850,000, providing plant facilities at Topeka, Kans., resulting in an over-all commitment of about $5,250,000. Goodyear Tire of Kansas, will operate these facilities, but title remains in DPC.

Goodyear Tire has named another group of men for key positions at its new tire plant at Topeka, Kan., which is expected to begin operations about the first of the new year. H. M. Hood, transferred from Goodyear Aircraft to the labor department at Plant 1 in Akron, is to be personnel manager at Topeka; while C. R. Washburn, now in compounding at Akron, will be development manager at the new factory. Its engineering manager will be A. N. Soderstrom, chief engineer in Goodyear's Jackson plant.

Postwar Prospectus

J. T. Callaway, manager of field operations, manufacturers' sales department, Goodyear Tire & Rubber, has prepared an unusual prospectus in the form of a scrapbook containing text and illustrations culled from periodicals which indicate prewar and midwar evidence of the vast amount of construction awaiting war's end. The presentation, "What Then, Mr. Contractor?," addressed to some 3,000 contractors, 800 industrial distributers, and 200 industrial machinery manufacturers, has been shown to groups of these and their organizations as well as mine operators, railroad executives, and logging heads throughout the country. The needs of the nation's railways and highways for new construction and of the mining and logging industry for rubber tired transport is set forth as well as current public works planning for airports and dams. The importance of rubber to all these operations is pointed out, and in behalf of the Goodyear company, the presentation concludes:

"Your problems are our problems, and we are committed to meet and blend the service requirements of the contractor, the distributer and the manufacturer. The mine operator and logger are not exceptions. Engineering development is on your side, highway obsolescence is on your side; postwar employment fluctuations will stimulate the cause; transportation trends are in your favor."

Mr. Callaway's presentation was shown in New York, N. Y., November 3 at the Lotus Club.

Ideas for postwar use by Goodyear dealers are being developed in the company's store planning and display department, now occupying 20,000 feet of space in Goodyear Hall, Akron.

Galen G. Cartwright has been made manager of Goodyear's sales promotion department. Mr. Cartwright, assistant manager of the company's advertising department for the past three years, has been with the organization since April, 1929.

A. G. Cameron, vice president and general manager of Goodyear Foreign Operations, Inc., has been elected a director of the China-America Council of Commerce & Industry.

The Timken Roller Bearing Co., Canton 6, has appointed J. Ringen Drummond, assistant factory manager, to succeed H. M. Richey, made factory manager last December. Mr. Drummond, who joined the company in 1926 as chief inspector, and later, assistant superintendent of its Columbus plant, has been doing experimental engineering in the Canton plant since 1932. He attended the California Institute of Technology.

MIDWEST

N.S.C. Rubber Section Officers

National Safety Council, Inc., 20 N. Wacker Dr., Chicago 6, Ill., has announced the recent election of the following to the executive committee of the Rubber Section for 1944-45: general chairman, Paul Van Cleef, Van Cleef Bros., Chicago; vice chairman in charge of program, J. E. Lovas, safety supervisor, United States Rubber Co., Passaic, N. J.; secretary, Roland Kastell, assistant supervisor of safety, U. S. Rubber, New York, N. Y.; *News Letter* editor, Stanley Wright, safety engineer, Inland Mfg. Division, General Motors Corp., Dayton, O.; engineering committee, chairman, Thos. H. Boyd, safety engineer, Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, and Glen D. Cross, safety director, Firestone Tire & Rubber Co., Akron, O.; health committee, chairman, J. Newton Shirley, medical director, Arrow Mutual Liability Insurance Co., Chestnut Hill, Mass., Fred Sands, U. S. Rubber, New York, and Walter Warner, Firestone; membership committee chairman, R. M. Weimer, personnel director, Dayton Rubber Mfg. Co., Dayton; publicity committee chairman, G. A. Balzersen, agent, Rubber Reserve Co., Port Neches, Tex.; statistics committee chairman, H. L. Andrews, safety engineer, Firestone.

Members at large: E. W. Beck, supervisor of safety, U. S. Rubber, New York; R. A. Bullock, personnel director, Corduroy Rubber Co., Grand Rapids, Mich.; Ralph S. Farnum, safety supervisor, U. S. Rubber, Detroit, Mich.; Oliver Hopkins, supervisor of safety, U. S. Rubber, Providence, R. I.; C. F. Horan, general manager, Arrow Mutual Liability; J. M. Kerrigan, manager, industrial

relations, U. S. Rubber Reclaiming Co., Buffalo, N. Y.; W. H. MacKay, employment manager, Dunlop Tire & Rubber Corp., Buffalo; R. W. Morse, director, compensation insurance department, Firestone; and Walter Schneider, safety engineer, B. F. Goodrich Co., Akron.

The Association of American Battery Manufacturers, Inc., held its nineteenth annual convention at the Palmer House, Chicago, Ill., November 2 and 3. E. T. Foote, vice president of Globe-Union, Inc., was reelected president, with the following officers and directors: L. B. F. Raycroft, first vice president; Lester Perrine, second vice president; A. H. Daggett, secretary; L. A. Doughty, treasurer; directors, A. J. Baracree, C. L. Feldtkeller, J. A. Minch, H. C. Montgomery, B. F. Morris, and A. G. Phelps. V. L. Smithers is commissioner. Because of the industry's intense interest in current and postwar development, the attendance was the largest in the history of the Association. Postwar merchandising was reviewed by representatives of battery manufacturers, mail-order houses, oil companies, and tire manufacturers' distributers. Maintenance of quality and minimization of types and sizes were stressed as important factors in successful and efficient distribution.

Reichhold Chemicals, Inc., Detroit, Mich., has announced that after serving for one and one-half years as chief of the Synthetic Resins Section, Protective Coatings Branch of the WPB Chemical Bureau, Ralph T. Urich has rejoined the Reichhold organization as sales manager of the chemical color division with headquarters at RCI's chemical color plant at 105 Bedford Ave., Brooklyn, N. Y. Prior to his service on WPB, Mr. Urich, following some ten years of experience in the dry color field, directed technical service work for both the resin and chemical color divisions of Reichhold Chemicals.

The Chicago Drug & Chemical Association held its regular luncheon-meeting November 30 at The Drake Hotel, when Capt. Michael Fielding, radio commentator, analyzed world affairs.

Monsanto Chemical Co., St. Louis, Mo., at its recent board meeting elected Felix N. Williams a vice president. Mr. Williams, general manager of the company's plastics division at Springfield, Mass., came to Monsanto with the acquisition of Swann Chemical Co., Anniston, Ala., with which he had been associated several years.

NEW ENGLAND

Kleistone Rubber Co., Inc., manufacturer of molded rubber goods, Warren, R. I., has elected Alfred B. Lingley a director and vice president in charge of manufacturing operations. He was formerly president and general manager of Goodyear Footwear Corp., Providence, R. I., from which he resigned in July, 1944.

Gas Mask for Bandaged Heads

A plastic gas mask with a hood of translucent vinylite film to protect headwound patients from war gas has been developed by the Chemical Warfare Service. The masks, which afford protection to patients with bandaged heads, faces, or jaws, are being produced by the Firestone Rubber & Latex Co., Fall River, Mass., and National Carbon Co., Bennington, Vt. A special tape produced by the Industrial Tape Co., New Brunswick, N. J., is used in securing the cannister and outlet valve of the plastic hood. Natural rubber tape would form a tacky mass when attached to the vinylite plastic.

Bristol Mfg. Corp., Bristol, R. I., recently announced the retirement of Hervey H. Bainton, for the past seven years its chief chemist. He began his career in the rubber industry as a rubber cutter for Davol Rubber Co., Providence, R. I., in 1886. Nineteen years later he became general foreman of the druggists' sundries department of the Canadian Rubber Co., Montreal, P. Q., Canada. Successively he was associated with the Davidson Rubber Co., Boston, Mass., Lee Rubber & Tire Corp., Conshohocken, Pa., Whital-Tatum Co., United States Rubber Co., in Providence, and Plymouth Rubber Co., Inc., Canton, Mass. After a few years as a part-time consultant Mr. Bainton joined the Bristol company. He belongs to the Rhode Island Rubber Club, the Odd Fellows, and the Masons.

American Resinous Chemicals Corp., Peabody, Mass., has opened a new pilot plant and additional research laboratories for further investigation of monomer polymerization to produce new resins and to coordinate developments in synthetics for paint, plastics, paper, textiles, leather, and specialty rubbers. The company also reported sale of industrial chemicals, particularly synthetic rubber compounds and resin and lacquer formulations for coating, finishing, impregnating, and laminating, totaling $1,100,000 for the first half of the year.

Davidson Rubber Co., manufacturer of druggists' sundries, bathing wear, sponge rubber, and molded specialties, Charlestown District, Boston 29, Mass., is constructing a new office building, manufacturing building, and building to house electrical equipment. The manufacturing building will contain a Banbury mixer and other equipment for milling and processing rubber. These new structures have been made necessary by the company's requirements of additional power and mixing and milling capacity. Besides they will make possible a new and more efficient plant layout. The expenditure required for the new buildings and equipment will amount to about $250,000 and will be financed by the company; no government loans are anticipated.

Compounding Ingredients Price Changes

Novac	lb.	$1.40		
Piccolastic A-5	lb.	.24	/	$0.245
A-25	lb.	.24	/	.245
Trichlorethane	lb.	.12	/	.15
Vultac No. 1	lb.	.38	/	.45
2	lb.	.38	/	.45
3	lb.	.42	/	.49

OBITUARY

Thomas Midgley, Jr.

IN CONSEQUENCE of an accident, the result of his condition as an infantile paralysis victim, Thomas Midgley, Jr., noted chemist, died at his home near Columbus, O., on November 2. Holder of more than 100 patents in various fields including gasoline, refrigerants, and chlorine and bromine compounds, Dr. Midgley was a pioneer in synthetic rubber research, which he had started early in 1928 while with the General Motors Chemical Co., but which he had abandoned because of the then limited marketing possibilities.

The deceased was born in Beaver Falls, Pa., on May 18, 1889. He attended Betts Academy and Cornell University, from which he was graduated in 1911 with the degree of mechanical engineer.

Then he went to work for the National Cash Register Co., but in 1915 with his father, also a noted inventor, established the Midgley Tire & Rubber Co., Lancaster, O. In 1916, however, Dr. Midgley returned to Dayton, O., to work under Charles F. Kettering, with whom he was later associated in the establishing of the General Motors Research Corp., of which he was a vice president.

At the time of his death Dr. Midgley was vice president of Ethyl Gasoline Corp., and of Kinetic Chemical, Inc., a director of Ethyl-Dow Chemical Co., and chairman of the board and president of the American Chemical Society. He had also been vice president of Ohio State University Research Foundation and vice chairman of the National Inventors Council. He belonged, too, to the Society of Automotive Engineers, Society of Chemical Industry, American Public Health Association, American Mathematical Association. National Academy of Sciences, Sigma Xi, Phi Kappa Phi, Tau Beta Pi, Alpha Chi Sigma, and Atmos. He had been, moreover, the recipient of the Nichols Medal in 1923, the Longstreth Medal of Franklin Institute in 1925, the Perkins Medal in 1937, the Priestley Medal in 1941, and the Willard Gibbs Medal in 1942.

Survivors include the widow, a daughter, and a son.

W. F. Gammeter

WILLIAM F. GAMMETER, president of The W. F. Gammeter Co., Cadiz, O., died October 31 in the Ohio Valley General Hospital after a brief illness. He was born in Akron, O., March 29, 1871. Mr. Gammeter had been engaged in manufacturing metal products for the rubber trade for the past 40 years.

Funeral services were held November 2 at his late residence in Cadiz.

He is survived by his wife, two sons, and three daughters.

Gutta Percha & Rubber, Ltd., Toronto, Ont., has named Peter Willing, head of the Ottawa branch, to succeed the late Alex Gordon as manager of the Pacific Coast division.

Patents and Trade Marks

APPLICATION

United States

2,359,347. **Window Light Consisting of a Translucent Sheet of Flexible Material Reenforced by Strips of Flexible Sheet Material.** T. C. Woodman, assignor to British Celanese Ltd., both of London, England.

2,359,380. **Jar Seal Including a Foraminous Fibrous Ring Carrying Thermoplastic Material.** G. E. Ostrom, Whittier, Calif., assignor to Chemre Corp., a corporation of Nev.

2,359,463. **Foundation Garment Anchor of Two-Way Stretch Material.** C. Bullinger, Riverside, Ill., assignor to A. Stein & Co., a corporation of Ill.

2,359,506. **Molded Gas-Mask Facepiece.** J. F. Battley, United States Army, D. O. Burger, Burbank, Calif., and R. Munro, Mountain, Md., assignors to the Secretary of War of the United States of America, as trustee.

2,359,573. **Inflatable Aerial Bomb for Distributing Fire-Smothering Gas over Fire Areas.** D. R. MacKay, Buffalo, N. Y.

2,359,586. **Pneumatic Tread Endless Track.** D. M. Sayler, Richmond, Calif.

2,359,726. **Bird or Shuttlecock for Badminton, Including a Hollow Thin-Walled Body of Plastic Material.** P. C. P. Booty, Chicago, assignor to C. G. Jansky, Oak Park, both in Ill.

2,359,804. **Woman's Garment Including Bodice, Brassiere, and Elastic Tapes.** G. H. Struthers, Flushing, N. Y., assignor to Sears, Roebuck & Co., Chicago, Ill.

2,359,843. **Life-Saving Garment.** J. C. Harris, Virginia Beach, assignor of one-half to B. L. Beem, Norfolk, both in Va.

2,359,844. **Inflatable Life-Saving Garment.** J. C. Harris, Virginia Beach, assignor of one-half to M. Garrett, Norfolk, both in Va.

2,359,974. **To Protect an Elongated Member from Paint Applied to Adjacent Areas, an Elongated Open-Ended Sleeve-Like Masking Element Having at Least the Sealing End of Stretchable Material.** J. E. Duggan, Detroit, Mich.

2,359,975. **One-Piece Mask of Resilient Material to Protect a Surface and Beveled Portion of an Annular Flange from Paint or Plating Material.** J. E. Duggan, Detroit, Mich.

2,360,032. **Girdle with Elastic Sections.** L. J. A. Amyot, Quebec, P. Q., Canada.

2,360,090. **Golf Ball Having a Center of Plasticized Thermoplastic Resin.** K. E. Wilhelm, Providence, R. I., assignor to United States Rubber Co., New York, N. Y.

2,360,193. **Emergency Oxygen-Delivering Outfit for Use in Parachute Escape at High Elevations.** W. M. Boothby and W. R. Lovelace, II, both of Rochester, Minn.

2,360,245. **Bolting Cloth of Nylon Threads in Which the Mesh Is Fixed by a Resin-Like Polyhydric Alcohol-Polybasic Acid Condensation Product.** R. A. McFarlane, Braintree, assignor to Courtaulds, Ltd., London, both in England.

2,360,312. **Insulated Wire Units Made from Wire Insulated with a Sheath Formed of Thermoplastic Fibers.** R. J. Aust, assignor to P. R. Mallory & Co., Inc., both of Indianapolis, Ind.

2,360,476. **Respirator.** F. O. Church, assignor to Dunlop Tire & Rubber Corp., both of Buffalo, N. Y.

2,360,506. **Shoe, the Entire Toe Portion of Which Is Made of Material Capable of Being Resolved by a Solvent into a Softened Plastic Condition and of Hardening and Shrinking on Evaporation of the Solvent.** G. A. Miner, Manchester, N. H., assignor to United Shoe Machinery Corp., Flemington, N. J.

2,360,528. **For Producing from Powdered Materials Articles with an Annular Groove, the Use of a Die Member Including an Annular Resilient Rubber-Like Portion.** C. R. Talmage, Dayton, O., assignor to General Motors Corp., Detroit, Mich.

2,360,577. **As a Sub-Combination in a Well Swab, a Packing Assembly Including a Mandrel Having Vertical Grooves Therein and a Split Elastic Sealing Element.** B. E. Parrish, Dallas, Tex.

2,360,663. **In Apparatus for Applying a Light Bias to Surfaces of a Photoelectric Member, a Methyl Methacrylate Light Conducting Element.** W. C. Eddy, Kenilworth, Ill., assignor to Radio Corp. of America, a corporation of Del.

2,360,734. **Compressible Wedge-Shaped Sealing Ring.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,360,736. **One-Piece Girdle of Deposited Latex Sheet Material.** A. N. Spanel, New York, N. Y.

2,350,830. **Flexible Sealing Binder for a Gasket Formed of Felted Glass Fibers.** H. B. Denham, assignor to Detroit Gasket & Mfg. Co., both of Detroit, Mich.

2,360,946. **Cord Reenforced Vulcanized Rubber with, as Bonding Agent, a Non-Resinous Non-Polymeric Tannin-Amine Reaction Product.** A. Hershberger, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,360,953. **Strip of Fabric Incorporating Thermoplastic Material to Form a Permanent Folded Edge for Trouser Cuffs.** D. C. Lippmann, Glenbrook, Conn., assignor to Celanese Corp. of America, a corporation of Del.

2,360,023. **Fly Swatter Blade of Woven Fabric of Twisted Paper Stiffened with Nitro-Cellulose, and the Whole Coated with Rubber Deposited from Latex.** J. S. Glomb, Coventry Township, assignor of one-half to T. C. Dethloff, Akron, both in O.

2,361,025. **Rubber Bushed Joint Construction.** M. P. Graham and A. Venditty, both of Detroit, Mich., assignors to Thompson Products, Inc., Cleveland, O.

2,361,152. **Knitted Fabric Including Elastic Yarn.** W. A. Saussaman and J. L. Bausher, assignors to Infants Socks, Inc., all of Reading, Pa.

2,361,205. **Expansion Joint for Masonry Structure in Which Each Brick of the Joint Has a Compressible Resilient Block Coextensive with One Face of the Brick, and an Elastic Band of Rubber-Like Material Stretched about Brick and Block.** J. R. Hoover, Stow, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,361,215. **Entrance Seal for a Rubber-Encased and Rubber Insulated Cable, Which Includes a Rubber-Like Stopper and a Rubber-Like Bushing.** E. H. Lamberger, Wilkinsburg and B. F. Langer, Pittsburgh, assignors to Westinghouse Electric & Mfg. Co., East Pittsburgh, all in Pa.

2,361,270. **In Treating Textile Fibers with Water-Repellents, the Improvement of Simultaneously Treating the Fibers with a Thermoplastic, Water-Insoluble Resin of the Group of Polymers and Interpolymers of Vinyl Derivatives.** L. Collins, A. Slowinske, and J. F. Smith, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,361,296. **Thin Coating of a Normally Pliable Thermoplastic Resinous Material to Strengthen Animal Skins.** W. D. Kennedy, Deerfield, Mass.

2,361,374. **Insulated Multiple Conductor Construction Including Spaced Parallel Conductors Interposed between Two Prefabricated Sheet Elements of a Flexible Non-Vulcanizable Thermoplastic Insulating Material.** C. W. Abbott, Larchmont, N. Y.

2,361,380. **Rain Garment.** J. T. Callahan, West Newton, and J. A. Gilbertson, assignors to Archer Rubber Co., both of Milford, both in Mass.

2,361,555. **Refrigerator Lid Having a Hollow Body of Rubber with Spaced Top and Bottom Walls, a Filler of Insulating Material, Rubber Stems Connecting Top and Bottom Walls, and Rubber Impregnated Fabric Extending over the Outer Faces of Top and Bottom Walls.** J. F. McWhorter, Cleveland Heights and M. W. Humphreys, Euclid, assignors to Ohio Rubber Co., Willoughby, all in O.

2,361,575. **Suspension System for Vehicles, Including a Collapsible Air Cushion.** T. H. Thompson, Detroit, Mich., assignor to Builder-Thompson Engineering & Research Corp., a corporation of Mich.

2,361,645. **V-Belt.** E. Nassimbene, assignor to Gates Rubber Co., both of Denver, Colo.

2,361,786. **Life-Saving Suit.** H. G. Morner, New York, N. Y.

2,361,843. **In a Toy Pistol a Rubber Band or Loop-Shaped Resilient Spring.** M. Hirsch, Brooklyn, N. Y.

2,361,890. **Flexible Rubber Tire Valve Stem.** F. H. Watson, Jonesboro, Ark., assignor to Jenkins Bros., Bridgeport, Conn.

Dominion of Canada

422,963. **Paint Mask Structure of Rubber or Rubber Composition.** J. E. Duggan, Birmingham, Mich., U. S. A.

422,993. **Sealing Strip of Compressible, Resilient Material, and Uncompressible, Tear-Resisting Material.** Bridgeport Fabrics, Inc., assignee of L. Spraragen, both of Bridgeport, Conn., U. S. A.

422,996. **Insulated Electrical Conductor.** Canada Wire & Cable Co., Ltd., Leaside, Ont., assignee of General Cable Corp., assignee of H. J. Kauth, both of New York, N. Y., U. S. A.

423,023. **Coat.** Kaufman Rubber (Ontario), Ltd., assignee of J. C. Howard, both of Kitchener, Ont.

423,039. **In a Strand Feeding Mechanism, Two Cooperating Rotatable Members of Firm, Resilient Rubber-Like Material.** Scott & Williams, Inc., assignee of P. F. Cooper, both of Laconia, N. H., U. S. A.

423,102. **Adhesive Sheet Consisting of a Base Sheet of Cellulosic Compound Coated on One Side with a Normally Adhesive Sulphonamid-Type Resin Partly Dissolved into the Face of the Cellulose Acetate Sheet, and a Normally Adhesive Vinyl-Type Resin.** Beutex Corp., assignee of E. F. Klein and C. E. Yates, all of Perth Amboy, N. J., U. S. A.

423,168. **Universal Joint Including a Pair of Yoke Members with Journal Portions Surrounded by Bearing Assemblies; Each Bearing Assembly Is in Turn Surrounded by a Resilient Cushion.** Thompson Products, Inc., Cleveland, O., assignee of A. Venditty and M. P. Graham, both of Detroit, Mich., both in the U. S. A.

423,172. **Pneumatic Roll Mounting for Belt Conveyers Including Pneumatic Tires.** United Steel Corp., Ltd., assignee of F. H. Eland, both of Toronto, Ont.

423,195. **Elastic Fabric.** H. Dreyfus, London, assignee of J. R. Wylde and H. A. Swift, both of Spondon, both in England.

423,216. **Sleeve Valve of Flexible Material Capable of Resuming Normal Shape after Being Deformed.** J. D. Langdon, Brooklyn, N. Y., U. S. A.

423,232. **Electric Cable Insulated with a Material Consisting Essentially of Normally Solid Polymer of Ethylene.** Canadian Industries, Ltd., Montreal, P. Q., assignee of Imperial Chemical Industries, Ltd., assignee of J. C. Swallow, both of London, and M. W. Perrin, Northwich, both in England.

423,272. **Molded Article of Laminated Sheets of Fibrous Material Having One Sheet Impregnated with Phenolic Condensate Resin, the Other with Phenolic Resin on One Side Only and a Coating of a Substantially Urea-Free Melamine-Aldehyde Resin on the Other Side.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of H. M. Elsey, Oakmont, Pa., U. S. A.

423,297. **Puncture-Sealing Inner Tube.** Firestone Tire & Rubber Co., assignee of R. F. Wilson, both of Akron, O.

423,354. **In a Wringer, an Endless Feed Belt of Elastic Material.** N. L. Etten, Waterloo, Iowa, U. S. A.

423,421. **Adhesive Fabric Including a Barrier Coat Consisting of Vulcanized Latex Dispersion.** Johnson & Johnson, Ltd., Montreal, P. Q., assignee of F. N. Mantley, Highland Park, and E. P. Wenzelberger, Plainfield, both in N. J., U. S. A.

423,443. **In Manufacturing Laminated Safety Glass, the Use of a Rubber Bag into Which the Assembly Is Placed before Being Subjected to Heat and Pressure.** Pittsburgh Plate Glass Co., Pittsburgh, assignee of L. D. Kesler, Tarentum, both in Pa., U. S. A.

423,450. **Fabric Pad for Laundry Presses Consisting of Layers of Open Mesh Asbestos Cloth Impregnated with a Synthetic Resin and Covered with a Resin-Impregnated Asbestos Cloth of Fine Quality.** Turner Bros. Asbestos Co., Ltd., assignee of E. L. Dawson, and H. Taylor, all of Rochdale, Lancaster, England.

423,470. **Tubeless Tire Assembly.** Wingfoot Corp., Wilmington, Del., assignee of R. W. Sohl, Akron, O., both in the U. S. A.

PROCESS

United States

2,359,590. **Insulated Electrical Conductors.** C. C. Smith, Cranford, N. J., assignor to Western Electric Co., Inc., New York, N. Y.

2,359,948. **Dipped Rubber Articles.** N. E. Tillotson, Watertown, Mass.

2,360,925. **Puncture-Sealing Hollow Bodies of Vulcanized Rubber.** E. T. Wyman, Brookline, Mass.

2,361,026. **Manufacture of Rubber Hose by the Use of a Mandrel Having a Stub End, and Method of Removing the Hose.** C. W. Greene, Toledo, O., assignor to Flex-O-Tube Co., a corporation of Del.

2,361,139. **Conduit Holders.** J. W. White and R. R. Harrison, North Hollywood, Calif., assignors, by mesne assignments, to Bendix Aviation Corp., South Bend, Ind.

2,361,371. **Treating Fabric Composed of Filaments of Normally Crystalline Vinylidene Chlor-**

ide Polymers to Reduce Thickness. A. W. Hanson, assignor to Dow Chemical Co., both of Midland, Mich.

2,361,682. Treating a Sheet of Textile Fabric Having a Coating of Unvulcanized Rubber so as to Produce an Intersecting Rib-Like Structure. J. Grabec, Bratislava, Slovakia; vested in the Alien Property Custodian.

2,361,900. Molding a Polymer of the Group of Polymeric Vinylidene Chloride and Its Normally Crystalline Copolymers. R. D. Lowry and R. C. Reinhardt, assignors to Dow Chemical Co., all of Midland, Mich.

Dominion of Canada

423,207. Extruding Fused Thermoplastic Compositions. H. Dreyfus, London, England.

423,230. Films from an Ethylene Polymer. Canadian Industries, Ltd., Montreal, P. Q., assignee of Imperial Chemical Industries, Ltd., London, assignee of M. W. Perrin, J. G. Paton, and E. G. Williams, all of Northwich, both in England.

423,244. Forming an Extrusion Coating of Synthetic Linear Polyamide on a Moving Wire Core. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. H. Balthis, Jr., Wilmington, Del., and A. W. Larchar, Mendenhall, Pa., both in the U. S. A.

423,291. Producing a Ribbed Microporous Battery Separator from Microporous Vulcanized Hard Rubber. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of S. I. Strickhouser, Edgewood, and E. C. Uhlig, Greenwood, both in R. I., U. S. A.

United Kingdom

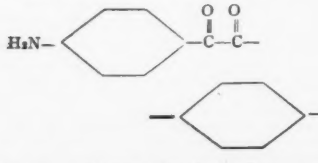
563,948. Pneumatic Tires. Wingfoot Corp.

563,960. Textile and Other Products from Polyvinyl Esters. R. P. Roberts, E. B. Johnson, and H. H. Taylor.

CHEMICAL

United States

2,359,280. The Compound of the Formula



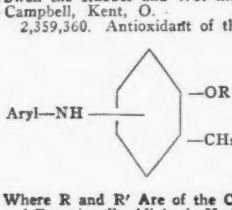
G. W. Anderson, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,359,314. For an Adhesive Cellulosic Sheet, a Normally Adhesive, Pressure-Sealing Sulphonamide Resin, Polyvinyl Acetate, and One or More of the Following Plasticizers: Dibutyl Phthalate, Ethyl Phthalyl, Ethyl Glycollate. E. F. Klein and C. Yates, both of Perth Amboy, N. J., assignors to Beutex Corp., a corporation of N. J.

2,359,336. Producing Benzene-Soluble Polycyclopentadiene by the Catalytic Polymerization of Cyclopentadiene in the Substantial Absence of All Other Compounds Polymerizable Under the Conditions Obtaining. S. G. Trepp, Swarthmore, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,359,354. Aiding the Incorporation of Finely Divided Pigment in Rubber by Spraying a Physically Dispersed Water Emulsion of Hydrocarbon Oil on the Rubber on the Roll to Swell the Rubber and Wet the Pigment. C. H. Campbell, Kent, O.

2,359,360. Antioxidant of the Structure:



Where R and R' Are of the Class of Hydrogen and Functionally Aliphatic Hydrocarbon Groups. C. F. Gibbs, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,359,374. New Product Obtained by Reacting Formaldehyde with Approximately Equivalent Proportions of Hydrochloric Acid and an Alkali Metal Salt of a Dithiocarbamic Acid at a Temperature under 15° C.; at Least One Mol of Formaldehyde Is Present for Each Mol of the Dithiocarbamate; the Reaction Product Contains Nitrogen and Sulphur in the Same Ratio as That in Which They Are Present in the Dithiocarbamate. J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,359,653. An Improved Resist or Reserve, for Use in Photography, Containing Pale Crepe Rubber. R. T. and R. I. Lewis, both of Manchester, England.

2,359,667. Treating an Aqueous Dispersion of Rubber with a Stabilizer and an Alkylene Polyamine to Flocculate the Dispersion; the Dispersion at the Time of Flocculation Has a Solids Content of at Least 13%. S. R. Ogilby, Eltingville, S. I., assignor to United States Rubber Co., New York, both in N. Y.

2,359,698. Sensitizing to Coagulation by Acidic Material an Aqueous Dispersion of a Rubber of at Least 25% Solids Concentration Containing a Stabilizer, by adding Organic Polyamine. E. C. Uhlig, Cranston, R. I., assignor to United States Rubber Co., New York, N. Y.

2,359,708. Aliphatic Polyether Polyamide Having the Formula

$$H_2NOC—CH_2CH_2—(OCH_2CH_2)X—CH_2CH_2CONH_2$$

Where x is an Integer Having a Value from One to Ninety. H. A. Bruson, assignor to Resinous Products & Chemical Co., both of Philadelphia, Pa.

2,359,759. Olefins. G. M. Hebbard and W. Hunt, assignors to Dow Chemical Co., all of Midland, Mich.

2,359,765. Vulcanizing Rubber with the Aid of a Member of the Lead and Zinc Salts of a Thiuram Polysulphide, Which Contains at Least One Amino Hydrogen Atom. P. C. Jones, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,359,810. Producing a Benzene-Soluble Polymer of Cyclopentadiene by Catalytic Polymerization in the Substantial Absence of Other Compounds Polymerizable under the Conditions Obtaining. S. G. Trepp, Swarthmore, Pa., assignor to United Gas Improvement Corp., a corporation of Pa.

2,359,874. Lacquer to Yield a Moisture-Resistant Transparent Film, Consisting of a Cellulose Derivative of the Group of Cellulose Esters and Cellulose Ethers, a Polymerized Rosin Ester and a Volatile Organic Solvent. A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,359,877. Manufacturing a Solution of Synthetic Linear Polycarbonamide Wherein the Average Number of Carbon Atoms in the Segments of the Chain Separating the Amide Groups Is at Least Two. O. E. Schupp, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,359,878. Dispersible Particles of Synthetic Linear Polyamide. O. E. Schupp, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,359,956. Lengthening Strips of Hydro-Chlorinated Rubber by Exposing the Rubber to the Fumes of Paradichlor-Benzol, Stretching the Rubber Longitudinally, and Then Sealing with a Paraffin Film. Le M. Wright, Wilmington, Del.

2,359,980. Addition Product of 1-Pimaric Acid and Maleic Anhydride from Pine Oleoresin. E. E. Fleck, Silver Spring, Md.; dedicated to the free use of the people of the United States.

2,360,049. Rubber Composition of Low Water Soluble Salt Content Containing as a Blowing Agent a Concentrated Solution of Ammonium Nitrite in a Polyhydric Alcohol Consisting Solely of the Elements Carbon, Hydrogen, and Oxygen. G. R. Cuthbertson, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.

2,360,150. Improving the Properties of Rubber-Like Polymers from Conjugated Diolefins by Mixing Therewith a Material Formed from an Oil-Modified Non-Drying Alkyd Resin and a Condensate of an Aldehyde, a Normally Liquid Alcohol in Excess, and at Least One Member of the Group of Carbamides and Amino-1,3,5-Triazines. F. J. Myers, assignor to Resinous Products & Chemical Co., both of Philadelphia, Pa.

2,360,204. Dihydro Resin Acids of the Formula $C_{20}H_{32}O_2$. R. B. Cox, assignor to Hercules Powder Co., both of Wilmington, Del.

2,360,205. A Halolactone of a Hydroxytetrahydroabietic Acid. R. F. B. Cox, assignor to Hercules Powder Co., both of Wilmington, Del.

2,360,206. Producing a Lactone of Oximinohydroxytetrahydroabietic Acid Melting at 184-185° C., and Having an Optical Rotation (α) D — 30° When in 2% Solution in Chloroform. R. F. B. Cox, assignor to Hercules Powder Co., both of Wilmington, Del.

2,360,207. Producing a Dihydroabietic Acid of Melting Point 147-148° C. and Specific Rotation (α) D + 68°. R. F. B. Cox, assignor to Hercules Powder Co., both of Wilmington, Del.

2,360,301. Producing Phenylacetaldehyde by Reacting in Vapor Phase Ethers of the Class of Beta-Phenylvinyl Ethers and Beta-Phenylethylidene-Glycol Ethers with Steam, in the Presence of an Acidic Catalyst. W. S. Emerson, Dayton, O., assignor to Monsanto Chemical Co., a corporation of Del.

2,360,306. Plastic Polyvinyl Acetal Resin Composition Substantially Lacking in Tackiness and Resistant to Light and Heat. H. K. Nason, assignor to Monsanto Chemical Co., both of St. Louis, Mo.

2,360,308. Process for Manufacturing Polyvinyl Alcohol Which Includes the Hydrolysis of Polyvinyl Formate in an Aqueous Medium Containing Formic Acid as the Acid Catalyst, Continuing the Hydrolysis until Solution Occurs. C. A. Thomas, Dayton, O., and S. R. Luce, Springfield, Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,360,320. Process for Producing a Plasticizer Suitable for Rubber-Like Materials from Acid Sludge Left after Treating Petroleum Oil with Sulphuric Acid. R. P. Ferguson, Cranford, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,360,367. A Dielectric Element for an Electric Condenser Including a Condenser Spacer Impregnated with a Dielectric of Cyclopentadiene Polymer Dielectric Resin Plasticized with a Chlorinated Aromatic Hydrocarbon Dielectric Plasticizer. S. Ruben, New Rochelle, N. Y.

2,360,382. Thermosetting Solid Composition from Zein Dissolved in Heat-Softened Shellac. H. M. Weber, West Englewood, N. J., assignor, by mesne assignments, to Prolamine Products, Inc., Dover, Del.

2,360,406. Filaments, Films, Etc. from a Fiber-Forming Polyamide. H. Dreyfus, London, and R. W. Moncrieff and C. W. Sammons, both of Spondon, both in England, assignors to Celanese Corp. of America, a corporation of Del.

2,360,449. Vulcanizing Rubber in the Presence of a Mercaptobenzothiazole Reaction Product Obtained by Vigorously Heating Paraformaldehyde, Cyclohexylamine, and Mercaptobenzothiazole at 130-160° C.; Water Is Driven from the Reaction Mixture. R. L. Sibley, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,360,477. Producing a Water Insoluble or Difficultly Soluble Substance by Reacting a Monomeric Acetal of a Mono-Aldehyde with a Solid Polymeric Aliphatic Base Material Containing Unreacted Hydroxyl Groups. J. Dahle, West Newton, assignor to G. J. Esselsen, Inc., Boston, both in Mass.

2,360,540. Coating Composition Including about 5% by Weight of a Polyvinylformal Resin Dissolved in 1,2,3-trichlorobutane. F. A. Bent and G. A. Stenmark, both of Berkeley, assignors to Shell Development Co., San Francisco, both in Calif.

2,360,632. Preparing Non-Asphaltic Linear-Type Polymers of High Molecular Weight by Polymerizing Isoolefins with a Metallic Halide Friedel-Crafts Catalyst at a Temperature Below —10° F. M. D. Mann, Jr., Roselle, and L. B. Turner, Elizabeth, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,360,645. Molding Mixture of Asbestos Fibers Bonded with Phenol-Formaldehyde Resin. D. S. Bruce and R. T. Halstead, Somerville, N. J., assignors to Johns-Manville Corp., New York, N. Y.

2,360,650. Reducing the Adhesiveness of Smooth and Pliable Adhesive Plastic Sheeting of Polyvinyl Acetal Resin. P. W. Crane, Upper Montclair, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,360,673 Producing Alpha, Omega-Dicarboxylic Acids by Oxidizing a Polymer Obtained from Ethylene Polymerized with at Least One Vinyloxy Compound. W. E. Hanford, Westwood Manor, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,360,712. Reducing the Adhesiveness of the Surfaces of Adhesive Plastic Interlayer Sheeting Consisting of Polyvinyl Butyral and an Ester Plasticizer Therefor. L. Paggi, Belleville, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,360,814. Converting Polyethylbenzene Which Includes Diethylbenzene into Monoethylbenzene. W. J Mattox, assignor to Universal Oil Products Co., both of Chicago, Ill.

2,360,864. A Rubbery Butadiene-1,3 acrylonitrile Copolymer Including as a Tack-Imparting Softener an Alkyl Substituted Phenol Having at Least One Alkyl Side Chain Containing More Than One, but Less Than Six Carbon Atoms. C. F. Fryling, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,865. A Butadiene-1,3 and Acrylonitrile Rubber and as Softener Therefor, Isophorone. B. S. Garvey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,866. Butadiene-1,3 and Alpha Methylene

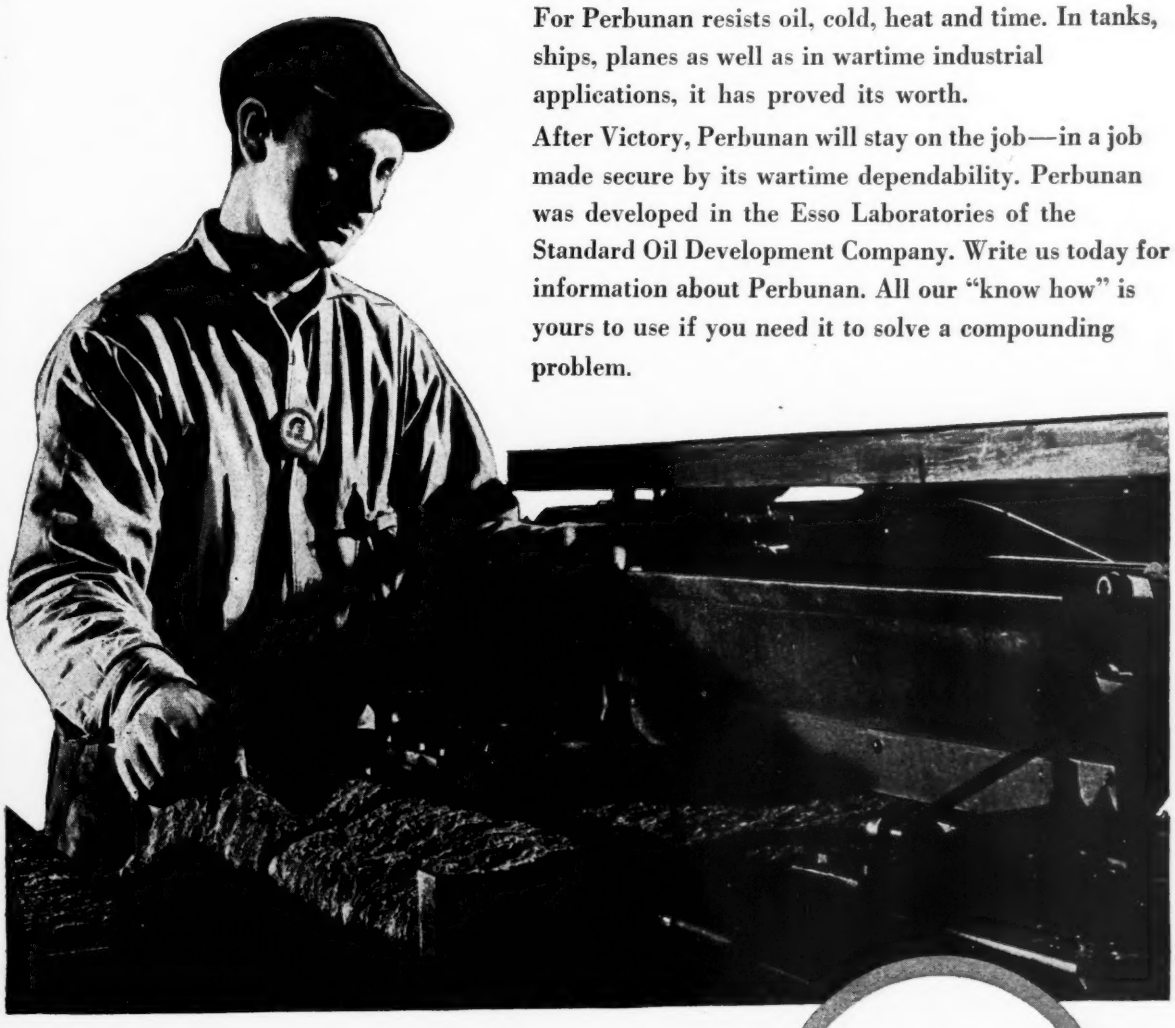
What's ahead for Perbunan?...

THERE'S NOT A RUBBER MAN in America who doesn't want to get the Japs out of the Malaya and East Indies rubber plantations. They remember the crisis when the Japs seized those places, and shut off our supply of Natural rubber.

But they remember how *synthetic* rubber stepped in to fill the need. And how Perbunan filled that need in many cases even better than the natural product!

For Perbunan resists oil, cold, heat and time. In tanks, ships, planes as well as in wartime industrial applications, it has proved its worth.

After Victory, Perbunan will stay on the job—in a job made secure by its wartime dependability. Perbunan was developed in the Esso Laboratories of the Standard Oil Development Company. Write us today for information about Perbunan. All our "know how" is yours to use if you need it to solve a compounding problem.



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THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME.

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Nitrile Copolymer and as Softener therefor an Ester of an Aromatic Monocarboxylic Acid with an Alcohol Containing Less Than Ten Carbon Atoms. B. S. Garvey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,867. Synthetic Rubber Cement Consisting of a Copolymer of Butadiene-1,3 and Acrylonitrile and as Solvent, a Liquid Nitroparaffin of the Formula R — NO_2, Where R Is an Alkyl Radical Containing One to Six Carbon Atoms. B. S. Garvey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,880. Producing a Lower Alkyl Ester of Methacrylic Acid by Heating the Corresponding Ester of Alpha-Hydroxy Isobutyric Acid with Benzotrichloride. E. L. Kropa, Old Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,360,895. Copolymer of a Butadiene-1,3 Hydrocarbon and at Least One Other Unsaturated Compound Which Contains a

$$CH_2=C\diagup\diagdown$$

Group, and as Softener Therefor, a Diester of a Polyalkylene Glycol with an Aliphatic Monocarboxylic Acid Containing Three to Eight Carbon Atoms. D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,896. Copolymer of a Butadiene-1,3 Hydrocarbon and Another Unsaturated Compound Which Contains a

$$CH_2=C\diagup\diagdown$$

Group and as Softener Therefor, an Ester of Aconitic Acid with a Monohydric Alcohol Containing Two to Eight Carbon Atoms. D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,897. Polymer of Butadiene-1,3, Hydrocarbon and as Softener, a Member of the Class of Benzyl Alcohol and Alkyl Ethers of Benzyl Alcohol, Where the Alkyl Group Contains Less Than Ten Carbon Atoms. D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,898. A Copolymer of Butadiene-1,3 and Acrylonitrile and as Softener, a Terpinyl Methyl Ether. D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,946. Vulcanized Rubber Reenforced by Cord Having as Bonding Agent a Non-Resinous, Non-Polymeric Tannin-Amine Reaction Product. A. Hershberger, Kenmore, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,360,947. Moistureproof Coating for a Transparent Sheet Wrapping Material; the Coating Consists of Thermoplastic, Resin-Like Rubber Derivative of the Plioform Type, Gum Damar, Montan Wax, and Benzyl Abietate. A. Hershberger, Kenmore, N. Y., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,360,990. Rubber Compounded with a Composite Amino Reaction Mixture Resulting from the Reaction of an Amino Substance with a Reaction Mixture Containing Carboxylic Acid and Non-Acid Oxygenated Bodies Produced by the Partial Oxidation of Petroleum Hydrocarbons Normally Liquid or Solid. E. A. Van Valkenburgh, New York, N. Y., assignor of three-fourths to Amino Products Corp., a corporation of N. Y.

2,361,015. Reclaiming Vulcanized Balata by Associating It with an Aliphatic Polyamine and Heating at Not Less Than 200° F. P. J. Dasher, Stowe, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,361,036. Producing an Alpha-Beta Unsaturated Monocarboxylic Acid. F. E. Kung, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,361,055. Polymerizing an Ester of (a) a Monohydric Alcohol Having an Unsaturated Linkage in an Aliphatic Chain of Three to Four Carbon Atoms and (b) an Acid of the Group of Acrylic Acid, Methacrylic Acid, and Chloroacrylic Acid. M. A. Pollack, Akron, O., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,361,070. Preserving Latex by Adjusting its pH to not Less Than 9.8 or More Than 10.0 and Adding a Small Proportion of a Zincate not More Than 18 Hours after Collection of the Latex from the Trees. W. D. Stewart, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,361,277. For Improving Fibrous Materials, a Stable Emulsion in Paste Form Having as an Aqueous Phase an Alkali Metal Caseinate Formaldehyde Solution Containing at Least One Further Substance Capable of Forming with Formaldehyde a Hardenable Aminoplast Condensation Product, and as an Oil Phase, an Organic Liquid Immiscible with Water and Non-Reactive with the Aqueous Phase. F. Enderlin and L. Schibler, assignors to Society of Chemical Industry in Basle, all of Basle, Switzerland.

2,361,322. Homogeneous Composition Including at Least One Thermosetting Resin and an N-Ethanol Carboxylic Acid Amine. P. C. Schroy, Darien, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,361,367. Removing Acetylene Polymer Impurities from Crude Acrylonitrile by Treatment with Sulphuric Acid. H. S. Davis, Greenwich, and H. A. Newey, Stamford, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

2,361,418. Thermoplastic Adhesive Sealing Composition for Fiber Container Joints Consisting of Polymerized Vinyl Acetate and Pine Wood Pitch. J. E. Robinson, Glen Ellyn, Ill., assignor to American Can Co., New York, N. Y.

2,361,438. Making Lightweight Plastic Composition by Embedding Starch Granules in an Uncured Phenol-Formaldehyde Resin and Curing by the Application of Heat and Pressure. P. S. Turner, Williamsport, Pa.

2,361,504. Vinyl Chloride and Vinyl Bromide Copolymers Polymerized to a Degree Which Would Render the Vinyl Chloride Insoluble in Ethylene Dichloride if Polymerized Alone. W. Scott, Akron, O., and R. B. Seymour, Allentown, Pa., assignors to Wingfoot Corp., Wilmington, Del.

2,361,527. Uniting Pieces of Fibrous Materials of Non-Mineral Origin by Means of a Polyvinyl Acetal Resin. F. S. Bacon, Newton, Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,361,538. Stabilization of Vinyl Compounds. R. A. Franz, Springfield, Pa., assignor to United Gas Improvement Co., a corporation of Pa.

2,361,539. Aliphatic Hydrocarbons Containing Conjugated Double Linkages. W. Friedrichsen, Ludwigshafen-on-the-Rhine, Germany; vested in the Alien Property Custodian.

2,361,543. Preserving Organic Substances against the Effects of Oxygen from the Air by Incorporating a Compound of the Formula:

$$Ar—NH—Ar'—O—Y—COOX$$

Where Ar Is an Aryl Group; Ar' an Arylene Group; Y a Hydrocarbon Radical; X Is of the Group of Hydrogen and Base-Forming Radicals. E. J. Hart, Cedar Grove, N. J., and R. T. Armstrong, assignors to United States Rubber Co., both of New York, N. Y.

2,361,552. Alpha-Dichloro-,Beta Monochloropropionyl Chloride. J. G. Lichty, Stow, assignor to Wingfoot Corp., Akron, both in O.

2,361,715. Low-Viscosity Lacquers of Urea and Formaldehyde. R. C. Swain, Riverside, and P. Adams, Stamford, both in Conn., assignors to American Cyanamid Co., New York, N. Y.

2,361,717. Preparing Polyamides. G. B. Taylor, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,361,802. Carbon Black. I. Williams and R. B. Takewell, assignors to J. M. Huber Corp., all of Borger, Tex.

Dominion of Canada

422,990. Producing a Resinous Material by Simultaneously Reacting a Hydrocarbon Mixture Containing Cyclic Hydrocarbons, with an Aldehyde and a Compound from the Group of Polycarboxylic Acids and Anhydrides of Polycarboxylic Acids in the Presence of a Condensing Agent. Atlantic Refining Co., Philadelphia, assignee of A. B. Hersberger, Drexel Hill, both in Pa., U. S. A.

422,991. Producing a Resinous Material by Reacting a Hydrocarbon Mixture of Relatively Wide Boiling Range Containing Carbocyclic Hydrocarbons with an Aldehyde in the Presence of a Condensing Agent from the Group of BF_3 Etherate, BF_3 Alcoholate, $H_2BO_2F_2$ and $H_3BO_2F_2F_3$. Atlantic Refining Co., Philadelphia, assignee of K. M. Thompson, Aldan, both in Pa., U. S. A.

423,154. Coating for Aircraft Propellers Consisting of a Film of Cellulose Ester Treated in a Bath Containing a Chlorinated Derivative from the Group of Ethylene Dichloride, Dichlorethyl Ether and Methyl Chloride Converted into a Solvent for the Cellulose Ester by the Addition of an Aliphatic Alcohol and a Non-Solvent Hydrocarbon from the Group of Toluene, Xylene, and Petrol, and as Plasticizer Ethylene Glycol Phthalate. Rayoid Mfg. Co., Ltd., assignee of G. S. Addington, both of London, England.

423,231. For an Electrical Conductor an Insulating Coating Consisting of a Polymer of Ethylene Which Is Solid at Normal Temperatures and Corresponds in Composition to $(CH_2)n$. Canadian Industries, Ltd., Montreal, P. Q., assignee of Imperial Chemical Industries, Ltd., assignee of M. W. Perrin, both of London, J. G. Paton and E. G. Williams, both of Norwich, both in England.

423,233. Monomeric Methacrylic Anhydride. Canadian Industries, Ltd., Montreal, P. Q., assignee of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of Norton Co., assignee of C. E. Barnes, both of Worcester, Mass., both in the U. S. A.

423,236. Condensation Reaction of an Olefin and a Member of the Group of Aldehydes and Hydrocarbons, Respectively, in the Presence of Boron Trifluoride. Canadian Industries, Ltd., Montreal, P. Q., assignee of D. J. Loder, Wilmington, Del., U. S. A.

423,237. Producing a Synthetic Resin from a Monobasic Acetylenic Acid of the Formula RC=C—COOH Where R Is of the Group of Hydrogen Atom and Alkyl Radicals, Reacted with an Organic Hydroxy Compound from the Group of Monohydric Phenols Having an Unsubstituted Ortho- or Para-Position, Polyhydric Phenols, and Polyhydric Alcohols. Canadian Industries, Ltd., Montreal, P. Q., assignee of A. D. Macallum, London, England.

423,238. Process in Which Polyvinyl Alcohol and a Cyclic Ketone Are Reacted Together in the Presence of Preformed Methylol Sulphonic Acid as a Condensation Catalyst. Canadian Industries, Ltd., Montreal, P. Q., assignee of G. S. Stamatoff, Arlington, N. J., U. S. A.

423,239. Reaction Products of Formaldehyde with a Phenol Obtained by Subjecting Trioxane to the Action of a Depolymerization Catalyst in the Presence of a Phenol and in a Substantially Anhydrous Medium. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. F. Walker, Lewiston, N. Y., U. S. A.

423,245. Copolymers of Maleic Anhydride and Styrene. Canadian Industries, Ltd., Montreal, P. Q., assignee of F. E. Condo, Cleveland, and C. J. Krister, Shaker Heights, both in O., and W. E. Lundquist, Wilmington, Del., both in the U. S. A.

423,246. Beta-Cyanoacrylic Acid Esters. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. W. C. Crawford, Frodsham, and N. McLeish and T. K. Wood, both of Runcorn, both in England.

423,247. Reaction Product of a Synthetic Linear Polyamide and a Substance Containing at Least One Group of the Formula —N=C=X, Where X Is an Element of the Class of Oxygen and Sulphur, the Group Being the Only Reactive Group in the Substance, and the Polyamide Being the Reaction Product of a Composition Including Substantially Equimolecular Amounts of Diamine and Dibasic Carboxylic Acid. Canadian Industries, Ltd., Montreal, P. Q., assignee of G. J. Berchet, Wilmington, Del., U. S. A.

423,248. Polymerizable Vinyl Ester of an Aliphatic Monocarboxylic Acid of not More Than 12 Carbon Atoms Having the Carbon Attached to the Carboxyl Attached to Four Carbon Atoms. Canadian Industries, Ltd., Montreal, P. Q., assignee of W. E. Hanford and W. E. Mochel, both of Wilmington, Del., U. S. A.

423,249. Partially Esterified Mixed Esters of Cellulose. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. W. Hill, Wilmington, Del., U. S. A.

423,250. Rubber Article with a Coating Made from a Mixture of Vinyl Resin and Phenol-Aldehyde Resin. Canadian Industries, Ltd., Montreal, P. Q., assignee of C. M. Langkammerer, Wilmington, Del., W. S. Gocher, Fairfield, and A. J. Jennings, Bridgeport, both in Conn., both in the U. S. A.

423,254. Opalescent Resin Resulting from the Polymerization of a Mixture of Methyl Methacrylate Polymer, Styrene Monomer, and a Second Monomer of the Group of Methyl Methacrylate, Methyl Acrylate, Vinyl Acetate, and N-Butyl Methacrylate Monomers. Canadian Industries, Ltd., Montreal, P. Q., assignee of C. E. Schildknecht, Bloomfield, N. J., U. S. A.

423,257. Sizing Sheets, Yarn, Etc. of a Synthetic Linear Polymer by Coating with a Tannic Acid and Then with a Polyhydroxy Film-Forming Material Soluble in Aqueous Media. Canadian Industries, Ltd., Montreal, P. Q., assignee of J. E. Bristol, Niagara Falls, N. Y., U. S. A.

423,258. In the Manufacture of Finely Divided Polyvinyl Acetate, Where It is Prepared in Finely Divided Form Suspended in an Aqueous Vehicle, the Steps of Coating the Particles with Sebacic Acid Before Drying and Then Drying at an Elevated Temperature. Canadian Industries, Ltd., Montreal, P. Q., assignee of T. R. Lemanski, Belleville, N. J., U. S. A.

423,259. Tooth Reconstruction Material Consisting Essentially of a Mixture of Methyl Methacrylate and a Small Amount of Methallyl Methacrylate. Canadian Industries, Ltd., Montreal, P. Q., assignee of M. M. Renfrew, Arlington, N. J., U. S. A.

423,293. Polyvinyl Acetal Formed from a Polyvinyl Alcohol and an Aromatic Aldehyde Capable of Coupling with a Diazo Compound to Form an Azo Dye. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of Du Pont Film Mfg. Corp., New York, N. Y., assignee of G. L. Dorough and D. M. McQueen, both of Wilmington, Del., both in the U. S. A.

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Any saving in rubber stocks, whether natural or synthetic, is a contribution to Victory. When such a saving is combined with improvement of the product, it is an achievement of which any manufacturer may be proud. Such was the recent accomplishment of a large manufacturer of essential mechanical rubber goods.

Surface Bloom, making the stock difficult to handle, had been traced to the softening agent being used with both natural rubber and GR-S. Following successful tests, this manufacturer changed to the use of Circo Light Processing Oil.

Oil Bloom was eliminated and the superior softening qualities of Circo Light Processing Oil permitted the use of less oil with a resulting increase in the tensile strength of the finished products.

An estimated 10% saving in natural rubber and GR-S was made possible in certain of the products by the use of Circo Light Processing Oil.

Such improvement in quality of products and economy of vital materials has been demonstrated in many similar cases.

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SUN INDUSTRIAL PRODUCTS

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MACHINERY

United States

2,359,532. **Means for Covering a Conductor with a Rubber Insulation Tubing.** M. O. Searle, Beverly Hills, Calif.

2,359,839 and 2,359,840. **Machine for Injection Molding of Plastics.** G. A. Goessling, St. Louis, Mo., assignor to Pro-Phy-Lac-Tic Brush Co., Florence, Mass.

2,360,000. **Injection Molding Machine for Plastics.** I. B. Lawyer, Mt. Gilead, O., assignor to Hydraulic Development Corp., Inc., Wilmington, Del.

2,360,011. **Mold for Casting Plastic Articles.** C. L. Popp, St. Clair, Mich., assignor to Standard Products Co., Port Clinton, O.

2,360,201. **In a Mold for Making Shaped Articles from Latex Foam, a Rigid Open Grid to Cover the Foam.** W. J. Clayton and J. F. Schott, Mishawaka, Ind., assignors to United States Rubber Co., New York, N. Y.

2,360,445. **Apparatus for Concentration of Liquids Such as Latex or the Like by Evaporation Under Vacuum.** K. H. Quasebarth, Kew Garden, N. Y.

2,360,899. **Building and Curing Form for a Completely Enclosed Hollow Article of Vulcanizable Rubber-Like Material.** E. M. Scharenberg, Everett, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,360,950. **Heat Conductive Tool for Welding Thermoplastic Organic Material.** F. P. Kilgour, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,361,348. **Apparatus for Making Balls.** J. B. Dickson, Northampton, and S. Milligan, Chicopee, both in Mass., assignors to A. G. Spalding & Bros., Inc., New York, N. Y.

UNCLASSIFIED

United States

2,359,418. **Hose Clamp.** R. A. Hartman, assignor to Tinnerman Products, Inc., both of Cleveland, O.

2,359,632. **Clamping Device for Crossed Cables.** C. E. Eales, assignor of one-half to A. P. Smalley, both of Swarthmore, Pa.

2,359,952. **Hose Coupling.** T. A. Welger, assignor to Whitehead Bros. Rubber Co., both of Trenton, N. J.

2,360,363. **Machine to Slit Cable for Salvage.** W. C. Pope, Seattle, Wash.

2,360,485. **Coupling.** B. H. Foster, Maplewood, and H. E. Sunbury, Rutherford, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,360,761. **Detachable Coupling for Flexible Hose.** J. E. Clickner, Dearborn, Mich., assignor to Flex-O-Tube Co., a corporation of Del.

2,360,836. **Conveying System for Handling Rubber Stock.** F. Leopold, Harmonville, assignor to Lee Rubber & Tire Corp., Conshohocken, both in Pa.

2,360,944. **Tester of Insulation on a Conductor.** H. F. Fruth, Elmhurst, Ill., assignor to Western Electric Co., Inc., New York, N. Y.

2,361,406. **Wheel Assembly.** G. A. Lyon, Allenhurst, N. J.

2,361,827. **Hose Coupling.** H. L. Dowell, assignor of one-half to G. I. Shelton, both of Athens, Tex.

Dominion of Canada

423,015. **Tire Bead Lock.** Firestone Tire & Rubber Co., assignee of W. S. Brink, both of Akron, O., U. S. A.

TRADE MARKS

United States

408,919. **Binkytoy.** Teething rings, pacifiers, and nipples. Binky Baby Products Co., New York, N. Y.

409,001. Representation of a black arrow containing the word: **"Intelin."** Electrical insulating materials. International Telephone & Radio Mfg. Corp., New York, N. Y., now by change of name, Federal Telephone & Radio Corp., a corporation of Del.

409,022. **W. S.** Petrolatum, a mixture of hydrocarbons used to impart permanent softness to rubber. Standard Oil Co. of New Jersey, Wilmington, Del.

409,026. **Sleepmaster.** Sponge rubber and synthetic rubber products for bedroom furniture. Sleepmaster Products Co., Inc., Newark, N. J.

409,090. **Gates Tex-Hide.** Hose. Gates Rubber Co., Denver, Colo.

409,091. **Gates Vulco-Hide.** Hose. Gates Rubber Co., Denver, Colo.

409,158. **Isopol.** Synthetic latex. Union Baystate Co., Inc., Cambridge, Mass.

409,169. **Uni-Flow.** Fountain pens. Universal Fountain Pen Co., New York, N. Y.

409,250. **Velofilm.** Films, sheets, and lamina of plastics and/or synthetic resins. Firestone Tire & Rubber Co., doing business as Firestone Industrial Products Co., Akron, O.

409,251. **Velofiex.** Artificial leather comprising a plastic and/or a synthetic resin material. Firestone Tire & Rubber Co., doing business as Firestone Industrial Products Co., Akron, O.

409,339. **Chemisole.** Composition sheet material of hydrocarbon for soles. M. Epstein, New York, N. Y.

409,356. **Cumate.** Accelerator. R. T. Vanderbilt Co., Inc., New York, N. Y.

409,382. **Plyophen.** Synthetic plastic resins and solutions of same. Reichhold Chemicals, Inc., Detroit, Mich.

409,661. **Hollco.** Posture and surgical belts. S. S. Hollender, Inc., Chicago, Ill.

409,669. **Kerazon.** Coated fabrics. Atlas Powder Co., Wilmington, Del.

409,695. **Circlepour.** Bottle closures. Owens-Illinois Glass Co., Toledo, O.

Rims Approved and Branded by The Tire & Rim Assn., Inc.

Rim Size	Oct., 1944
15" & 16" D.C. Passenger	
10x4.00E	83,062
16x4.25E	18,322
16x4.50E	12,445
15x5.00E	2,645
15x5.00F	1,383
15x5.50F	3,792
16x5.00F	3,334
15x6-L	3,338
16x6-L	1,818
17" & Over Passenger	
18x2.15B	6,710
Flat Base Truck	
20x3.75P (5")	1,064
20x4.33R (6")	34,660
15x5.00S (7")	7,704
20x5.00S (7")	387,423
18x6.00T (8")	7
20x6.00T (8")	42,546
20x7.33V (9/10")	76,034
22x7.33V (9/10")	13,939
24x7.33V (9/10")	17,419
Semi D.C. Truck	
16x4.50E	2,304
15x5.50F	6,047
16x5.50F	4,813
Tractor & Implement	
12x2.50C	1,478
15x3.00D	16,719
16x3.00D	1,560
24x6.00S	1,835
36x6.00S	2,623
40x6.00S	372
24x8.00T	1,790
28x8.00T	901
36x8.00T	1,010
W8-24	1,164
W8-32	2,147
W8-36	1,941
W8-38	3,405
W9-28	2,679
W9-38	320
W10-24	268
W10-28	3,017
W10-36	2,028
W10-38	3,642
DW8-38	1,030
DW10-38	1,509
DW11-26	739
DW11-28	2,035
DW11-30	218
DW11-32	569
DW11-36	1,362
DW11-38	113
DW12-26	797
DW12-34	166
TOTAL	788,246

Dividends Declared

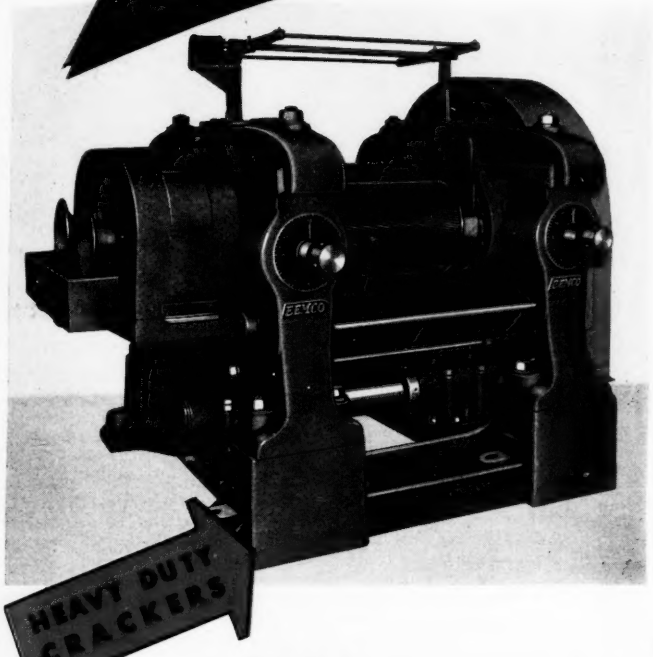
Company	Stock	Rate	Payable	Stock of Record
Boston Woven Hose & Rubber Co.	Pfd.	$3.00 s.	Dec. 15	Dec. 1
Canada Wire & Cable Co., Ltd.	"A"	1.00 q.	Dec. 15	Nov. 30
Canada Wire & Cable Co., Ltd.	"B"	0.25 q.	Dec. 15	Nov. 30
Canada Wire & Cable Co., Ltd.	Pfd.	1.625 q.	Dec. 15	Nov. 30
Crown Cork & Seal Co., Inc.	Com.	0.25	Dec. 20	Dec. 4
Crown Cork & Seal Co., Inc.	Pfd.	0.5625 q.	Dec. 15	Nov. 30
Firestone Tire & Rubber Co.	Com.	0.50 yr. end	Dec. 11	Nov. 30
Flintkote Co.	Com.	0.45 yr. end	Dec. 9	Nov. 20
B. F. Goodrich Co.	Com.	0.50	Dec. 12	Nov. 24
B. F. Goodrich Co.	Pfd.	1.25 q.	Dec. 28	Dec. 8
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	2.50 extra	Dec. 31	Dec. 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	0.63 q.	Dec. 31	Dec. 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	5% Pfd.	0.625	Dec. 31	Dec. 15
Hewitt Rubber Corp.	Com.	0.25 q.	Dec. 15	Nov. 30
I. B. Kleinert Rubber Co.	Com.	0.30 yr. end	Dec. 12	Dec. 1
Lima Cord Sole & Heel Co.	Com.	0.10	Dec. 20	Dec. 11
Raybestos-Manhattan, Inc.	Com.	1.00	Dec. 12	Nov. 27
Tyer Rubber Co.	Com.	0.50	Nov. 15	Nov. 9
Tyer Rubber Co.	Pfd.	1.50 q.	Nov. 15	Nov. 9
United Elastic Corp.	Com.	0.10 extra	Dec. 9	Nov. 15
United Elastic Corp.	Com.	0.35 q.	Dec. 9	Nov. 15
United States Rubber Co.	Com.	0.50	Dec. 15	Nov. 24
United States Rubber Co.	Pfd.	2.00	Dec. 15	Nov. 24

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Balata		
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅜	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	11⅝	.29¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

* For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

MILLS-CRACKERS REFINERS-WASHERS



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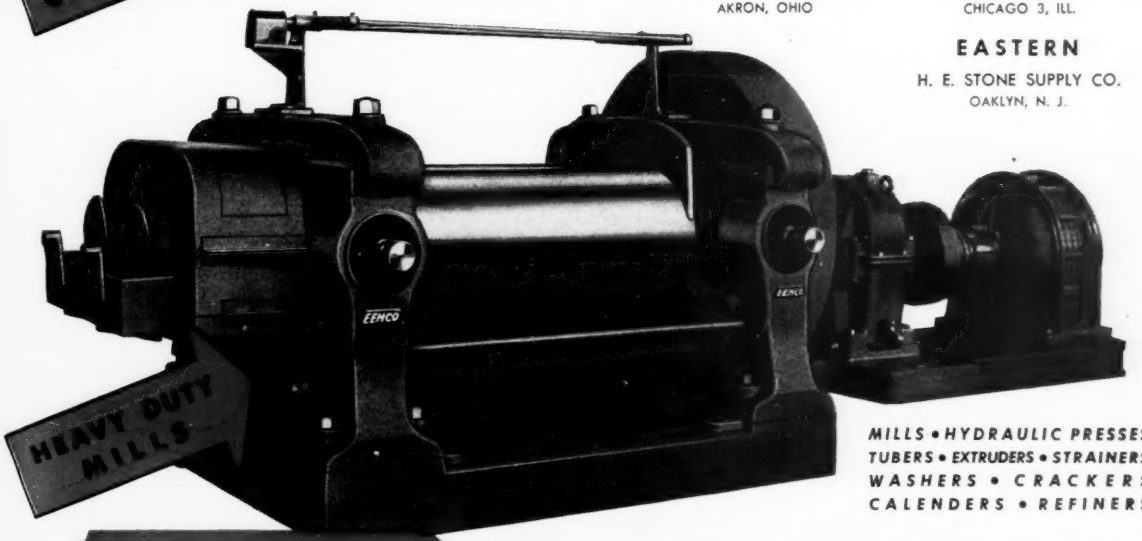

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(For all types of synthetic Polymers)

Paradors are available in a number of grades to meet the many different applications in synthetic formulations to which they may be applied, since it is not alone the odor of the synthetics which must be modified but also the odor developed by the addition of other ingredients to secure a special product, such as adhesives or molded items. Paradors are all different in odor character and cover a wide price range.

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Many manufacturers of synthetic rubber products are finding it practical to work with Givaudan in overcoming their odor problems. You, too, may benefit from Givaudan's knowledge and experience in overcoming odor problems. We will be glad to make recommendations without obligations.

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Drum Up-Ender

Up-Ender Facilitates Drum Handling

AN APPLIANCE for up-ending filled steel drums consists of two 12-inch lengths of 1½-inch steel pipe which fit over the metal runners of a Colson-type barrel truck. These pipes are reenforced with a welded, curved metal strip, cross-braced with each other. The curved strip is notched at the ends and slides around the axle of the truck as the device is slipped over the drum runners. Two sets of steel rollers or solid wheels attached at the curvature of the reenforcing strips give additional strength and increased lift facilities. The ends of the lift pipes are flattened to rectangular shape to fit over the truck runners. The free ends, which come in contact with the side of the drum, are similarly shaped, but at an approximate angle of 45 degrees to conform to the contour of the drum. A solid steel bar, with a ¼- to ⅜-inch lip leveled off, is welded to the extremity of the pipe to afford a better grip to the drum chime.

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(FOR FURTHER DETAILS, SEE AD ON PAGE 252)

In rubber compounding, we're looking at one goal

CONTRIBUTING to Victory is the goal you see as you work on rubber-compounding problems. Our eyes are on the same point as we study ways in which Monsanto chemicals can serve the war-busy rubber industry.

Working together today, as we have for so many years, may lead to the simplification of complicated problems. The combination of your experience in rubber compounding and production and our knowledge of chemicals as applied to rubber compounding can, we believe, make a substantial contribution to speeding the day of peace.

If you think we might be of assistance on a wartime problem, please call HEmlock 6191 and a technical representative will be on his way to serve you, or if you prefer, write: MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron, Ohio.

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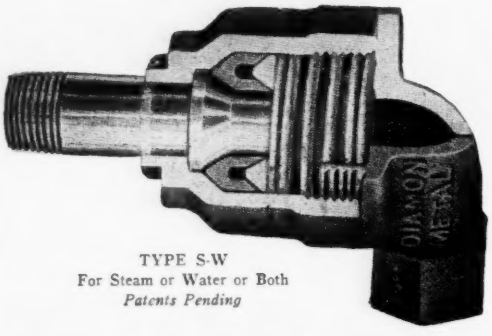

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DIAMONDS do not — cannot leak — even in continuous 24 hour service on alternating steam and cold water. They put a definite end to frequent repacking and costly shut-downs.

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A Chicago rubber firm writes: "We have found your joints to be most satisfactory. We like them more than any connection that has been presented to us." (name on request.)

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Sizes ⅜", ½", ¾", 1" and 1¼". Shipped from stock. No waiting.

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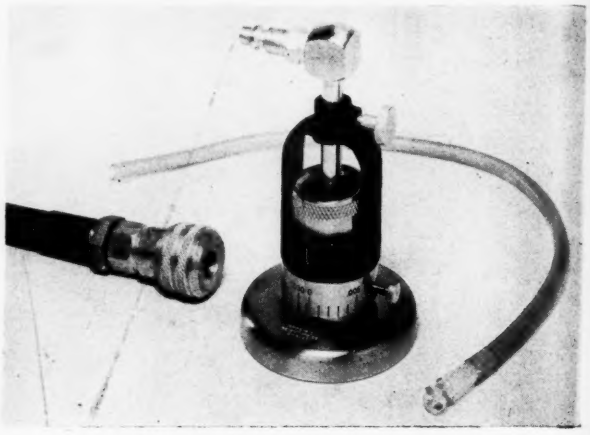
found in a plant repair or machine shop. The cost of labor and materials is about $15 per unit. More detailed information may be obtained from du Pont finishes division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.



Precision NRL Rubber Seal Aging Test Jig

Test Jig for Rubber Seal Materials

THE Precision NRL rubber seal aging test jig is used to duplicate service behavior of rubber for hatches, watertight and airtight door gaskets and airports to Bureau of Ships Specification 33R9 1NT. The jig can be used to determine the amount of air pressure required to produce a leak at any given indentation or to determine the indentation for any amount of air pressure. Made entirely of brass and stainless steel and finished in dull satin chrome, the jig consists primarily of a heavy base, a holder for a 1.129-inch diameter sample (area one square inch), an adjustable canopy, an indentor stem, and a quick-acting air coupling. The thickness of the sample may vary from ⅛ to ½-inch. In use the sample is inserted in the sample holder, and the indentor stem allowed to rest on the surface of the sample for the initial zero reading. The indentor stem is locked, and the canopy turned clockwise one revolution, which action forces the indentor stem into the sample a distance of 1/32-inch, at which point it is automatically held in place by turning a set screw in the base. The test jig is then placed in an aging oven. After aging for a predetermined time at a predetermined temperature the air coupling is fastened to the jig; a small amount of water is placed on the sample, and air pressure applied until a slight leak or air bubble is detected at the water surface. The pressure required indicates the service behavior of the material. The jig weighs two pounds. Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.

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Up Where Temperatures Reach 60° Below

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● Flying Fortresses have over 9 miles of electrical wiring, consisting of 8000 separate pieces. In the past, Neoprene synthetic rubber coating for this wiring had a tendency to become brittle and crack in extreme stratosphere cold.

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GREAT BRITAIN

Harrisons & Crosfield Meeting

At the thirty-sixth ordinary general meeting of Harrisons & Crosfield, in London, on October 24, Chairman H. Eric Miller reviewed the company's business year ended June 30, 1944. He recalled that in January the concern had completed 100 years of existence. Owing to present conditions there was no general celebration of the occasion, but it was observed by the distribution of a bonus to the staff in which those who are in the services or are prisoners of war were not forgotten, and donations to certain good causes.

The firm's financial condition remains strong and liquid, and there were further improvements in the market value of its investments in tea, rubber, and other produce companies. The profit for the year, after various deductions, was £258,932, or about £17,000 more than in the preceding fiscal year. Dividends totaling 10% were paid on the deferred ordinary shares.

In the course of his speech Mr. Miller praised the United States for having "performed a virtual miracle in making good the shortage" of rubber, adding: "They have thus saved the situation for the United Nations in that, as in so many other ways in which their vast resources have been freely devoted to the common cause of defeating our enemies."

The ties which were now binding the two nations so closely should not be lightly broken, he continued, though voices were being raised by some narrow-minded and self-seeking men, including American Senators, in a sense contrary to the spirit in which the good fight is being fought.

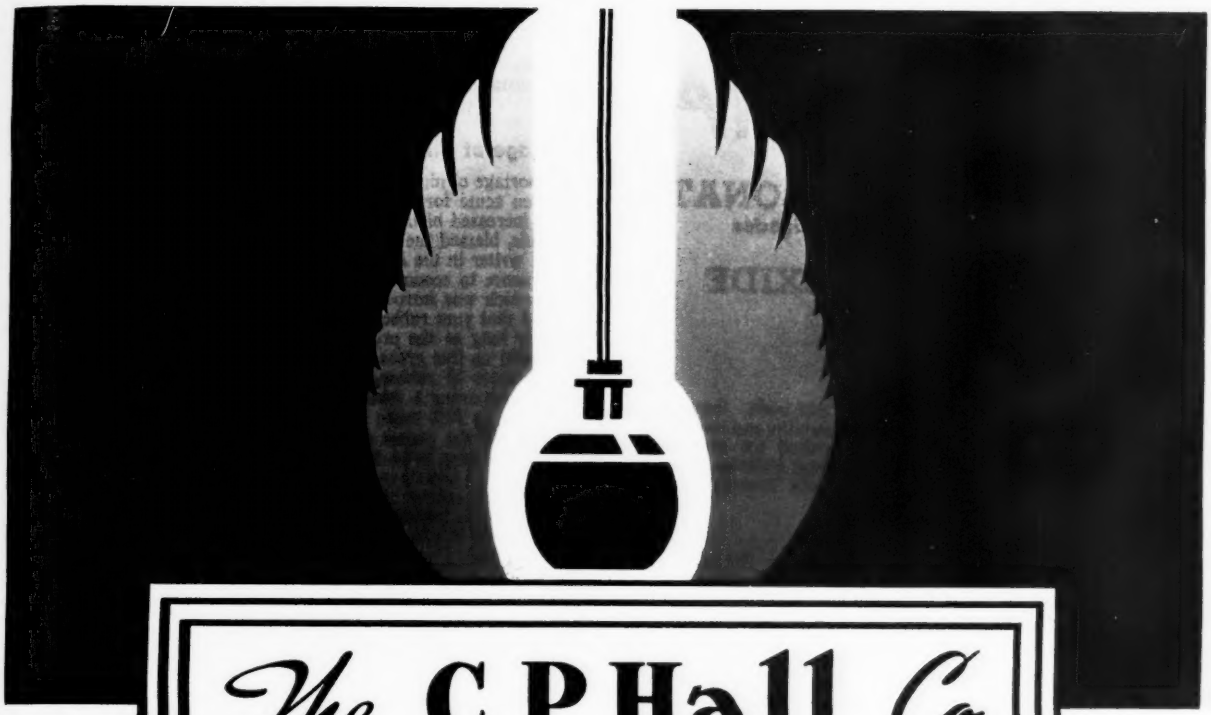
He referred with satisfaction to the exploratory conversations held in August in London on postwar rubber problems by officials of the British, United States, and Netherlands Governments and the decision to form an informal study group which would meet from time to time. However, while these steps were appreciated, he said, the plantation side of the industry was also giving its active attention to some of the practical problems that will arise when the territories now held by the Japanese are liberated. It was reasonable to assume, Mr. Miller went on to say, that for some time after the war there would be an urgent need of all rubber produced. But it was necessary to look ahead to the time when world demand for rubber for the usual peaceful purposes could be satisfied and a potential surplus production was again in sight, and then new uses would have to be thought of. Here Mr. Miller returned to the favorite prewar suggestion for large-scale use of rubber—as road surfacing material, the outstanding advantages of which the company had always believed would more than repay its higher initial cost. The many roads that will have to be reconstructed, he added, will "afford an excellent opportunity to introduce such a beneficial improvement." Substantial capital would be needed to manufacture rubber-capped road blocks on an adequate scale, and this might well come into the program of postwar reconstruction, he concluded.

Heat Embrittlement of GR-S Vulcanizates

The problem of minimizing heat embrittlement of GR-S type of synthetic rubber was the subject of a paper in *India Rubber Journal* by J. S. Hunter, of the research laboratories of Monsanto Chemicals, Ltd., Ruabon, North Wales. Some of the published work on the matter is reviewed, and experiments carried out at the laboratories are discussed. Reference is made to a comparatively recent paper by Hendricks,[1] in which it was suggested that to get satisfactory heat stability and heat build-up, GR-S should be vulcanized with a minimum of sulphur "driven home" by a powerful accelerator combination. Hendricks further pointed out that with certain commonly used accelerators in GR-S, though there is in general a decrease in ultimate elongation with increase in time of cure, after aging in the air oven there is actually in some cases an increase in elongation with time of cure. The heat stability is therefore better at overcure.

Work at the Monsanto laboratories led to the same general conclusions, which suggest the broader generalization that for good heat stability and otherwise satisfactory vulcanizates there

[1] "Compounding of GR-S for Heat Resistance," *Rubber Age (N. Y.)*, Mar 1944, pp. 521-25.



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must be low sulphur, powerful acceleration, and also a tight cure.

It is emphasized that in this investigation only one aspect of the problem was considered, and the effect on heat build-up and tear resistance has not yet been assessed.

Shortage of Nipples

A shortage of nipples for infants' feeding bottles and of pacifiers has been acute for some months. Some say the shortage is due to the increased birth rate. Hugh Dalton, president of the Board of Trade, blamed the poor quality of present-day nipples. Whereupon a writer in the *India-Rubber Journal* attempted to show that the measure to economize on rubber by banning pure rubber nipplies, which was introduced in 1942, was defeating its own ends. He said that pure rubber nipples formerly made by his firm lasted twice as long as the present filled nipples. Hence where 144 infants used up five gross of pure rubber nipples containing a total of 70 ounces of rubber, they now wear out ten gross of filled nipples containing a total of 105 ounces of rubber, thereby actually using up 50% more rubber.

Whatever the causes of the dearth of nipples, it became sufficiently pressing to be discussed in the House of Commons where both male and female members for several weeks repeatedly called for action to relieve the shortage. A chronicle of events shows that about the middle of September, Mr. Dalton promised that more rubber would be released for nipples. On September 26 he stated that enough rubber had been issued to meet the demand.

On October 3, Captain Waterhouse (Parliamentary Secretary of the Board of Trade) found it necessary to remind members that it takes a certain length of time for the crude rubber to be turned into nipples. This caused one member to ask helpfully whether the honorable gentleman knew that when he was a baby, there were no pacifiers at all and that he used to have a sugar bag put into his mouth.

By November 7 feminine exasperation evidently turned to despair and dire suspicion, for a woman member accused the president of the Board of Trade of wanting "to eliminate women and children." She then asked, "Will you conform with the policy of the government which is understood to be to allow their continuance?"

Rubber Industry Notes

The Dunlop Rubber Co., already preparing for postwar expansion, has appointed six new sales managers in the general rubber goods division in Manchester: P. A. Bridge, hose and belting; T. Donlon, proofing and suedette; F. Hyde, mechanicals and roller covering; E. Jones, chemical plant and vulcanite; N. Jones, flooring; E. Sharp, surgical and toys.

A new division for special products, particularly of an industrial type, has been formed by Dunlop. General sales manager will be A. E. Osborn, hitherto acting manager for Dunlop in Manchester.

The Goodyear Tire & Rubber Co., Ltd., Wolverhampton, has extended the Goodyear Commercial Scholarship policy. The firm now offers two scholarships as prizes in a competition by rubber technology students. The competition is open to sons, daughters, brothers, and sisters of Goodyear employes, and the scholarships are for one year at the South Staffordshire High School of Commerce.

To make Britain known in Europe when the war is over, Claude W. Bell, chairman of Bell's Asbestos & Engineering, Ltd., suggests a series of British exhibitions "grandiose in conception, far-reaching in design, skilfully, and elaborately coordinated" be held in the principal cities of Europe within twelve to eighteen months after the cessation of hostilities.

SWEDEN

The war has given a great impetus to Sweden's utilization of what was once a useless and troublesome waste product of the sulphite-pulp industry, sulfite liquor, now the source of large amounts of sulphite alcohol and an increasing number of valuable chemical materials.

Sweden has large forests, and before the war, wood, sulphite pulp, and paper products constituted almost half the country's total exports. In manufacturing sulphite pulp, about one-half of the pulp is left behind in the sulphite liquor, most of which was

formerly discarded as useless. In 1909, however, alcohol began to be produced from it locally, and, stimulated by the first World War, the new industry developed rapidly for a time. After some ups and downs, the output of sulphite alcohol (9,000,000 gallons) grew until by 1939 there were 20 plants with total capacity of 35,000,000 liters of alcohol a year. The alcohol was used largely for admixture with motor fuel and also for technical and household purposes.

When the present war broke out and shut Sweden off from her principal markets for wood, pulp, and paper products, the country was forced to reduce the output of these products, and that at a time when war conditions rendered imports of gasoline uncertain and the need of locally produced alcohol all the more necessary. To meet the emergency the government took steps to help the manufacturers keep up the output of alcohol; at the same time, however, increased efforts were made to develop new products from sulphite alcohol as well as from other by-products of the pulp manufacturing industry. These efforts have been relatively successful. In 1941 few products were made from the alcohol; now various materials, including several that are important for the rubber and plastics industries, are made.

The total output of sulphite alcohol has increased since 1939 to a present 115,000,000 liters (30,500,000 gallons) annually; while the number of plants has grown to 33.

Investigations have also been made with the aim of utilizing lignin, another important by-product of sulphite liquor. So far lignin has been used in Sweden chiefly in making adhesives, in ligno-sulphonic acids, and as an extender in tanning extracts, but eventually it will also be an important ingredient in the local manufacture of plastics. In fact small quantities are already being employed in this way.

The by-products of Swedish pulp mills have become so important that concerns have been operating principally to supply sulphite alcohol, liquid rosin, and cellulose yeast, and continued research is expected still further to increase the value of the pulp industry by discovering additional uses for both its products and by-products.

Portugal is taking steps to increase its participation in the supplying of crude rubber to belligerents. Recently an order went to Angola, Portugal's West African colony, instructing local authorities to intensify rubber extraction in the rubber areas in the Provinces Malange and Bie.

In making Buna synthetic rubbers the Germans employ carbide, and in the process of carbide gassification a waste product called Buna lime is obtained. Reports state that it has now been discovered that this material is useful as a fertilizer.

BULL'S EYE ACCURACY IN WORKING RUBBER

The careful following of temperature schedules in working both natural and synthetic rubber is a necessity in producing uniform product. A dependable instrument for determining surface temperatures of rolls is of course essential. The Cambridge Roll Pyrometer is accurate, sturdy and quick-acting. It is so convenient to use that workers will use it consistently. Write for descriptive bulletin.

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ROLL ● NEEDLE ● MOLD
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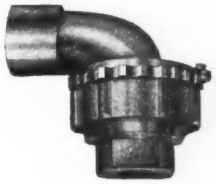
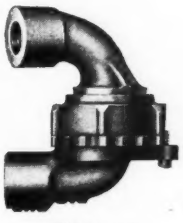


STYLE "B"
FOR RIGHT ANGLE BENDS



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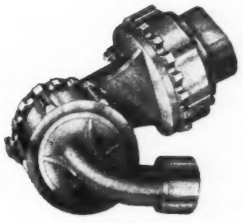
DOUBLE ANGLE RETURN BEND



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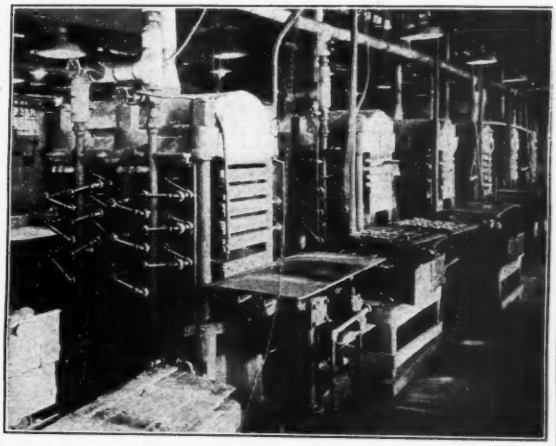

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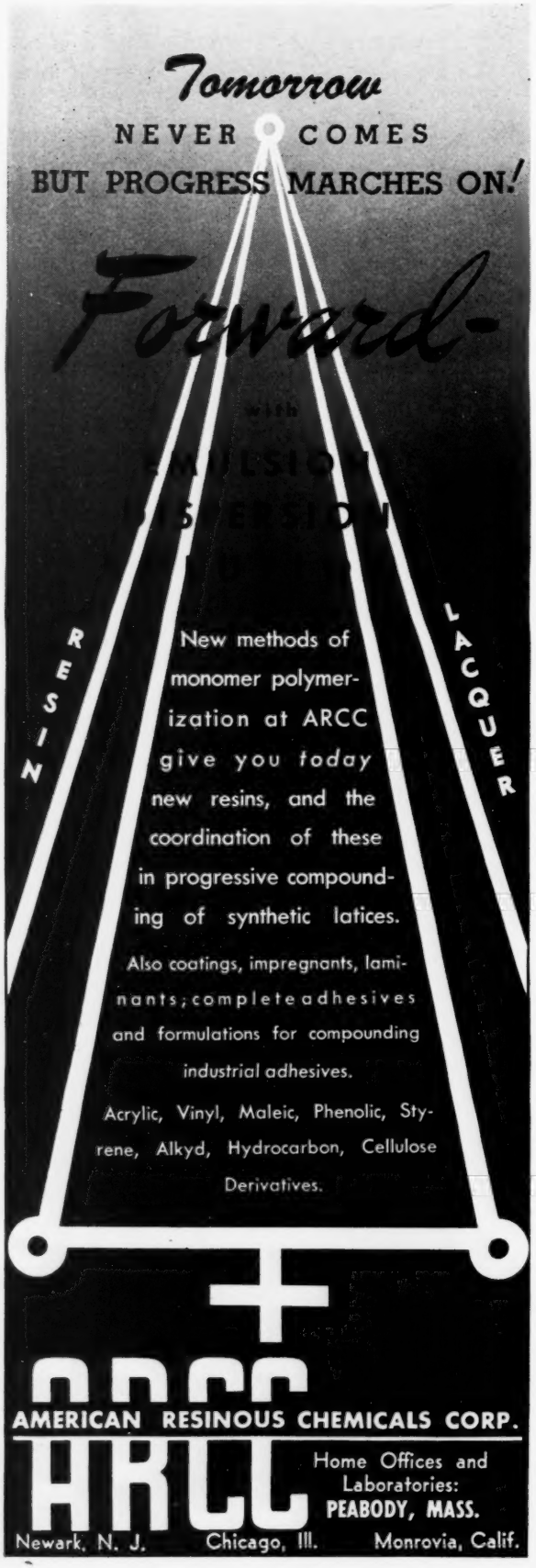
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Editor's Book Table

BOOK REVIEWS

"The History of Rubber Regulation, 1934-1943." Edited by Sir Andrew McFadyean for the International Rubber Regulation Committee. Published by George Allen & Unwin, Ltd., London, England. Distributed in the United States by W. W. Norton & Co., Inc., 70 Fifth Ave., New York, N. Y. 1944. Cloth, 8½ by 5½ inches, 250 pages. Price $3.25.

Schemes for the adjustment of supply to demand for raw materials have not been markedly successful because demand is a great deal more elastic than supply. Rubber, one of the world's strategic essential materials, has been the subject of more than one experiment in restriction. This book surveys early voluntary rubber control schemes and submits the facts and an interpretation of them concerning the formulation and operation of the International Rubber Regulation Agreement. It reveals the problems encountered in drawing up a restrictive plan acceptable to many nations and in its administration from 1934 to 1941. About 50 pages are given to a description of the committee's work covering the seven-year period of control. An appendix of about 100 pages contains the texts of the agreement and of the subsequent American Reserve Stock Agreements and statistical information on production, consumption, prices, and planting and production costs.

This book suggests the difficulties likely to be faced in postwar attempts at international regulation of the production of raw materials. Helpful to a consideration of those future problems would be a discussion of the long term-effects which the various restriction and regulation schemes have had on the rubber industry. Some of the economic and practical objections to control schemes are stated in a final chapter, but these are discussed only from the point of view of more immediate disadvantages to the industry.

"Plastic Horizons." B. H. Weil and Victor J. Anhorn. The Jaques Cattell Press, Lancaster, Pa. 1944. Cloth, 7¾ by 5½ inches, 176 pages. Index. Price $2.50.

Our grandfathers wore celluloid collars. From this first synthetic material in an age of natural substances the authors of this non-technical account of the development of plastics carry the reader through the rapid progress of the present and give us a glimpse of the broad and versatile horizon beyond the day of victory.

Science is well blended with economics in the discussions of the raw materials and their processing into plastic products and their uses in war and peace. A chapter, "Synthetic Fibers and Synthetic Rubbers," briefly records factual data of a general nature of the most widely known man-made fabrics and elastomers. Of valuable reference use is a list of more than 300 resins, plastics, synthetic rubbers, and synthetic fibers. The chemical type and manufacturer are given for each.

"The Preparation of Plantation Rubber in Ceylon." Revised Edition, 1943. Issued by the Rubber Research Scheme (Ceylon), T. E. H. O'Brien, Director, Research Laboratories, Dartonfield, Agalawatta, Ceylon. Board covers, 9 by 5½ inches, 50 pages. Index.

This volume was prepared to replace a previous edition published in 1929. It describes the methods of preparation of smoked sheets, pale crepe, and lower crepe grades now recommended in Ceylon, without special reference to limitations imposed by wartime shortages of materials and equipment. Each step of preparation and processing is carefully detailed, and defects and their causes in the finished products with suggested remedies are given. Proper methods of tapping and latex collection in the field, treatment of latex in the factory, and the packing of rubber for transportation are also briefly discussed.

Plans for a modern smoked sheet factory with a tunnel-type smoke house, and a crepe factory with a warm air drying house, each of 2,000 pounds per day capacity, are reproduced. Throughout the book the necessity of cleanliness and exaction in all operations is stressed as well as the proper maintenance of machinery and equipment. This concise guide to standard methods should prove valuable to Ceylon producers as a means of achieving uniformity of quality of plantation rubber which in the past has shown important variations in such properties as rate of vulcanization, plasticity, and resistance to aging after vulcanization.

"Uses and Applications of Chemicals and Related Materials." Volume II. Compiled and edited by Thomas C. Gregory. Based on data published in the *Oil, Paint, and Drug Reporter*. Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 1944. Cloth, 9 by 6 inches, 528 pages. Price $9.

Volume I of this compilation, published in 1939, listed 5,167 substances and their industrial uses. Volume II covers 2,642 additional chemicals and related materials and their industrial applications. Also included is an index of uses covering both volumes and arranged by a classification or grouping based on the function for which the material is used. There is an index of synonyms and cross-references, an index of United States and British patents cited in the "Uses and Applications" sections of both volumes, and a list of the names and addresses of the owners of the patents. The makers, the sellers, and the users of chemicals, as well as technical workers, research bureaus, and libraries, will find this compilation of chemical facts a useful directory.

NEW PUBLICATIONS

"Resin Coating Compositions, Lacquers, Emulsions, and Dispersions." American Resinous Chemical Corp., Peabody, Mass. 24 pages. This illustrated pamphlet presents a brief discussion of the theory of emulsions, dispersions, and solutions and gives specific information regarding the various vinyl, acrylic, maleic, alkyd, synthetic rubber, and ethyl cellulose resins produced by the company. There are a comprehensive compilation of uses for them and a description of each of several major fields of utilization.

"Statex No. 93 Blends with Micronex." Bulletin No. 132. Binney & Smith Co., 41 E. 42nd St., New York, N. Y. 3 pages. This bulletin shows the possibilities of mixtures of Micronex and Statex 93 carbon blacks which give somewhat better abrasion resistance than straight Statex 93 treads. The results of tensile tests conducted at temperatures determined from heat build-up suggest that Statex 93 compounds do not lose tensile so rapidly as temperature is increased as do stocks made with other types of carbon black. At elevated temperatures physical properties obtained with Statex 93 are claimed to be superior to those obtained from channel blacks.

"Resistance to High Temperature." Tentative Supplement No. III, Section No. VII to Synthetic Rubber Technical Data. Stanco Distributors, Inc., 26 Broadway, New York, N. Y., 10 pages. This report presents data summarizing investigations on heat resistance of Perbunan. The effects of vulcanization, age-resisting additives, pigment fillers and reenforcing agents, and softeners on the heat-aging properties of Perbunan are discussed, and test result tables are included to illustrate these effects. Recommendations for various accelerators and fillers are made.

FOR GOOD ABRASION RESISTANCE USE PHILBLACK A

(FOR FURTHER DETAILS, SEE AD ON PAGE 252)

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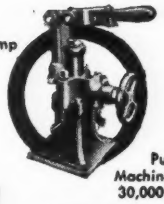

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All pumps can be furnished with hydraulic gauges.

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Porcelain GLOVE FORMS

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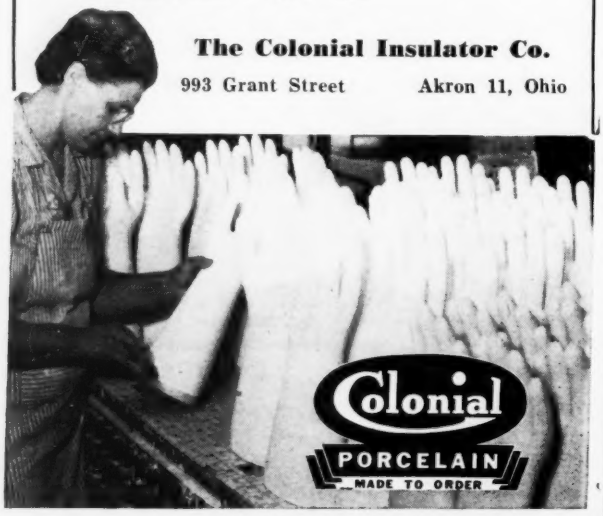

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"GR-S Compounds for Wire and Cable." Booklet No. 5C. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 12 pages. This booklet presents several compounds typical of base compounds used by the wire and cable industry. It illustrates the use of Vanderbilt accelerators, antioxidants, fillers, and other compounding ingredients to obtain special-purpose stocks with desirable physical properties. Test data are given.

"Piccolastic Styrene, Substituted Styrene and Homologues." Standard Chemical Co., Akron Savings & Loan Bldg., Akron, O., 16 pages. This bulletin describes a group of 25 permanently thermoplastic resins which have a large number of uses including stiffening, tackifying, plasticizing, and extending rubber, chlorinated and cyclized rubber, ethyl cellulose, and vinyl polymers. Others indicated applications are as a component of adhesives, wire and cable insulation, jar rings with GR-S, cheese wrappers and other coatings, and tank linings. A table of physical properties for the series is given.

"Effect of Milling on Properties of *Hevea* and Buna Rubbers" and **"Effect of Moisture on Curing Rate of GR-S."** Columbian Colloidal Carbons, Vol. V, No. 3. Columbian Carbon Co., 41 E. 42 St., New York, N. Y. 26 pages. The two papers by W. B. Wiegand and H. A. Braendle in this issue were read before the 1944 spring meeting of the Division of Rubber Chemistry, A. C. S., in New York.

"Chemigum." Goodyear Tire & Rubber Co., Inc., Akron 16, O. 54 pages. This well-illustrated bulletin describes the manufacture, compounding, properties, and uses of Chemigum, Buna N and Buna S types of synthetic rubbers. Since the synthetic rubber now being manufactured for the government under the name of GR-S by Goodyear as agent for Rubber Reserve Co. is of the Chemigum S type, most of the discussion in the bulletin deals with Chemigum N.

"Volume Correction Factors for C_4 Hydrocarbon Mixtures." Compiled by C. S. Cragoe. Letter Circular LC-757. National Bureau of Standards, United States Department of Commerce, Washington, D. C. 23 pages. Compiled at the request of the Rubber Reserve Co. to facilitate accurate determinations of quantities in containers at existing temperature and pressure and to supplement previous compilations, the tables in this pamphlet apply to mixtures consisting entirely of C_4 hydrocarbons and C_4 mixtures containing limited amounts of C_3 and C_5 hydrocarbons which come within the range of 40 to 80 lb/in.², absolute, vapor pressure at 100° F., and the range 0.56 to 0.63 specific gravity at 60°/60° F. The tables should prove useful in commercial transactions and in checking inventories.

"Tetraethanolammonium Hydroxide" and **"Trichlorethane."** Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. These data sheets give the physical properties and other technical information concerning two recently developed chemicals. Tetraethanolammonium hydroxide is a suggested ingredient of rubber chemicals, and trichlorethane is said to be a good solvent for natural rubber and some types of synthetic rubber.

"Resins and Plastics for Geon-Hycar Blends." Technical Bulletin PM4. B. F. Goodrich Co., 324 Rose Bldg., Cleveland 15, O. 8 pages. This pamphlet indicates the advantages and limitations of Geon-Hycar blends. Uses for which these blends are recommended are given, and compounding techniques and mixing operations discussed. There are four pages of data on the curing and physical properties of typical formulations.

"The Mechanism of Halogen-Substitution Reactions, and the Additive Halogenation of Rubber and of Dihydromyrcene." C. E. Bloomfield. Publication No. 48. The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3, England. 8 pages. This paper, Part VI in the series "Rubber, Polyisoprenes, and Allied Compounds," is a highly specialized one. The author attributes to cyclization the diminished unsaturation of the chlorosubstitution products of dihydromyrcene and rubber. In rubber the process was found to be complete. A tendency to cyclization also appeared in the substitutive bromination of rubber by *N*-bromosuccinimide. Additive bromo- and chloro-derivatives of rubber were found to be comparatively stable and gave no indication of a spontaneous elimination of halogen acid either through cyclization reactions or the reformation of double bonds at temperatures up to 80° C. Mr. Bloomfield also concluded that the provision of chlorine in free radical form appears to be an essential condition for obtaining the wholly additive chlorination of rubber and allied olefins.

"GR-S Compounds of Various Hardnesses." BL-168. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 14 pages. This report gives typical GR-S formulations and their physical properties in 40 to 90 Shore durometer Type A hardness ranges. Five or more stocks in each range, except 90 hardness, show the possibilities of various accelerators and accelerator combinations. Suggested typical uses for each stock are also listed.

"Synthetic Rubber Tires, Care and Use." Maintenance Bulletin No. 41. Office of Defense Transportation, Washington, D. C. 18 pages. This vehicle maintenance bulletin discusses tire use and maintenance practices which have the greatest effect on tire casing life. Information concerning the nature and limitations of the synthetic materials used in tire and tube manufacture which will aid truck and bus operators in saving tire casings is included. Code letters and markings for synthetic rubber and war tires are given.

"From the Shadoof to the Dominant Drive." Multiple V-Belt Drive Association, 140 S. Dearborn St., Chicago 3, Ill. 48 pages. This booklet is a thumbnail history of man's effort to transmit power. The shadoof, perhaps the earliest machine based on the lever as a means of power transmission, was a device for obtaining or transporting water. It consisted of a pole hung on a post in such a way that it could be swung easily up and down or around. From one end a bucket was suspended and from the other a weight heavy enough to overbalance the bucket when filled. Other means of power transmission throughout the centuries are described and illustrated. The origin, development, and standardization of the V-belt, recognized as the greatest forward step in the history of power transmission, is carefully told.

"Modern Precision. 'General-Catalogue' Issue." Leeds & Northrup Co., Philadelphia 44, Pa. 28 pages. **"High Tensile Strength Neoprene Compounds."** E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 4 pages. **"3-M Adhesive Data for Sealing-Insulating-Adhering-Sound Deadening-Coating."** Minnesota Mining & Mfg. Co., Detroit 2, Mich. 8 pages. **"Nothing Takes the Place of Glycerine.** 1583 Ways to Use It." Glycerine Producers' Association, New York, N. Y. 36 pages. **"Sulphur**—An Essential to Industry and Agriculture." Texas Gulf Sulphur Co., Inc., New York, N. Y. 46 pages. **"Physical Properties Pertinent to the Storage of a Number of Commercially Important Liquids and Gases."** Bulletin No. 7.427-B. Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa. 24 pages. **"Reconversion.** A Report to the President from Director of War Mobilization, James F. Byrnes." Office of War Mobilization, Washington, D. C. 14 pages. **"Passenger Car Handbook."** Sept., 1944 Edition. The Tire & Rim Association, Inc., Akron 8, O. 36 pages. **"Airplane Handbook."** July, 1944 Edition. The Tire & Rim Association, Inc. 56 pages. **"Lists of Inspected Appliances Relating to Accident Hazard, Automotive Equipment, and Burglary Protection."** Sept., 1944. Uderwriters' Laboratories, Inc., Chicago, Ill. 78 pages. **"Catalog of Adhesives, Coatings, Primers, and Sealing Compounds."** B. F. Goodrich Co., Akron, 0. 64 pages. **"B. F. Goodrich U. S. Army Training School Manual.** Design and Construction of Pneumatic Tires." 50 pages.

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Ducks

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Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Sept. 30	Oct. 28	Nov. 4	Nov. 11	Nov. 18	Nov. 25
Dec.	22.08	21.66	21.49	21.77	21.61	21.71
1945						
Jan.	22.02	21.59	21.42	21.75	21.59	21.69
Mar.	22.13	21.76	21.58	21.90	21.73	21.68
July	21.97	21.58	21.43	21.73	21.56	21.52
Oct.	....	20.74	20.68	20.99	21.87	20.80
Dec.	....	20.54	20.55	20.94	21.77	20.70

AFTER steady advances following the national election cotton futures prices in November eased into a downward trend. The 15/16-inch spot middling price of 22.16c per pound on November 8 rose to 22.27c on November 13, declined to 21.99c on November 21, and closed at 22.14c December 2. It is expected that the government purchase program will tighten up the market as the season moves along. Substantial export business is anticipated. Demands this month have been unusually low for this season of the year because spinners have small interest in extending their purchases further than just a few months ahead.

According to the Bureau of Economics, the domestic supply of American cotton in 1944-45 is estimated at 22,250,000 bales. About 10,600,000 bales represent the carry-over at the beginning of the season. Despite labor handicaps picking and ginning of the 12,320,000-bale current crop is nearing completion. Cotton of this year's growth ginned to November 14 totaled 9,488,193 bales, excluding linters. The Department of Agriculture announced the cotton acreage goal for 1945 at 20,472,000 acres, unchanged from this year.

Fabrics

The wide industrial cotton goods market has become so tight that rated orders are being adjusted to the essentiality of the consumer's needs. Almost no free goods are available to any maunfacturer at present. Virtually no cotton duck is reaching the market. Few gray goods sales are made for delivery beyond the end of the year. Although a slight rise is expected in production of cotton sales yarn in the fourth quarter of this year, a drop of about 14% below 1943 totals is estimated for the whole year, based on a recent report of the Bureau of Census.

An increasing use of Buna S for raincoats has been reported, and the steady demand in the raincoat market during the past months is expected to continue. Although neoprene has been released for general use, the cotton yarn shortage is holding back the larger use of synthetic elastic webbing.

Effective November 1, Amendment 7 to OPA Supplementary Order 92 permits selling all fabrics which come within the scope of Order M-91 with an adjustable pricing clause.

J. A. Krug, WPB chairman, recently announced that public interest will require that WPB controls be maintained over cotton textiles after the defeat of Germany to guard against disruptive shortages.

Amendment 26 to MPR 127 reduces converters' margins on both cotton and rayon finished goods. On contracts entered into prior to November 15 deliveries may be made at former price levels until January 2, 1945.

New York Quotations

November 24, 1944

Drills		
38-inch 2.00-yard	yd.	$0.195
50-inch 1.52-yarn		.29
52-inch 1.85-yard		.23875
52-inch 2.20-yard		.20511
59-inch 1.85-yard		.25202
Ducks		
38-inch 2.00-yard S.F.	yd.	.22125
40-inch 1.45-yard S.F.		.2975
51½-inch 1.35-yard D.F.		.335
72-inch 1.05-yard D.F.		.43/.45
Mechanicals		
Hose and belting	lb.	.3975*
Tennis		
51¼-inch 1.35 yard S.F.	yd.	.3275
51¼-inch 1.60-yard D.F.	yd.	.28875
Hollands — Rubber		
20-inch	yd.	.1225/.145
30-inch		.22/.2575
40-inch		.245/.29
Osnaburgs		
36-inch 2.94 Cl.	yd.	.1271
40-inch 2.11 P.W.		.1623
40-inch 2.65 Cl.		.1408
40-inch 3.65 P.W.		.10273
Raincoat Fabrics		
Cotton		
Bombazine 64 x 60, 5.35	yd.	.135
Bombazine 64 x 56,5.50		.1325
Print cloth, 38½-inch, 64 x 60		.09439
Sheeting, 40-inch		
48 x 48, 2.50-yard	yd.	.172
64 x 68, 3.15-yard		.14761
56 x 60, 3.60-yard		.12638
44 x 40, 4.25-yard		.10352
Sheetings, 36-inch		
48 x 44, 5.00-yard	yd.	.091
40 x 40, 6.15-yard		.07398
Tire Fabrics		
Builder		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.48
Chafer		
14 ounce 60" 20/8 ply Karded peeler	lb.	.48
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.45
Cord Fabrics		
23/5/3 Karded peeler, 1 1/16" cotton	lb.	.44
15/3/3 Karded peeler, 1 1/16" cotton	lb.	.42
12/4/2 Karded peeler, 1 1/16" cotton	lb.	.42
23/5/3 Karded peeler, 1¼" cotton	lb.	.44
Leno Breaker		
8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.45

* Basis.

RECLAIMED RUBBER

THE demand for reclaimed rubber in November was reported active in virtually all lines including heels and soles, mechanical goods, sponge rubber, and battery boxes. The supply was termed adequate to meet requirements but more tube reclaims could be sold if more scrap tubes were available. Inventories are said to be of fair size but not unwieldy, and a rise in demand, which is not unlikely, may reduce them considerably. Although there is no widespread activity in synthetic reclaims, an increase in this field is believed to be only a question of time.

Reclaimed Rubber Prices

	Sp. Grav.	c per Lb.
Auto Tire		
Black Select	1.16-1.18	6¾/ 7
Acid	1.18-1.22	7¾/ 8
Shoe		
Standard	1.56-1.60	7¼/ 7½
Tubes		
Black	1.14-1.26	11½/11¾
Gray	1.15-1.26	12¾/13½
Red	1.15-1.32	12¼/12¾
Miscellaneous		
Mechanical blends	1.25-1.50	4¾/ 5¾
White	1.35-1.50	13¾/14¾

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

THE general demand for scrap rubber was not heavy in November. Lack of interest was attributed to current inventories held by reclaiming plants. Although the pressure is off tubes now, demand for them has continued at a fair rate, and reclaimers are still accumulating inventories at ceiling prices. Such inventories are not dangerously high. Demand for boots and shoes and tire parts has been exceedingly small. The stockpile of Rubber Reserve Co. which has furnished reclaimers with a large part of their requirements during the past year will be exhausted of passenger tires at the end of the year, but some tonnage of truck and bus tires will remain. In 1945 reclaimers will have to draw upon normal collecting channels, and more activity can be expected by the trade.

Scrap rubber sales by government agencies have been fairly numerous. They cannot be regarded as a criterion of the market. Some bids are in excess of current market prices by 25% because of premium grades contained in the lots offered for sale. After sorting, the condition of some tires warrant their resale.

Scrap Rubber Ceilings

	c per Lb.
Inner Tubes†	
Red passenger tubes	7½
Black passenger tubes	6¾
Truck tubes	6½
	$ per Short Ton
Tires‡	
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Mixed truck tires	20.00
Solid tires	36.00
Peelings†	
No. 1 peelings	52.25
No. 2 peelings	33.00
No. 1 light colored (zinc) carcass	57.75
Miscellaneous Items*	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 115 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
* All consuming centers.

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American eight inch gun, protected by Duck, rolls along French highway toward Metz . . . and the Germans. Even big guns need Duck for protection from the weather.

DUCK IN HOLLAND

Their possessions safely rolled up in Duck, American soldiers ride past a section of the bombed Zinkwit-Fabriek (Zinc Factory) at Maastricht, Holland. Duck has endless duties on the fighting fronts.

DUCK IN THE REICH

U. S. First Army soldiers under heavy German fire attack the Siegfried line in the Aachen area. Note duck tarpaulin in use right at the front line. In Duck musette bags, each man carries his own supplies.

Wherever Allied forces fight today, tough, rugged Duck is protecting them and their equipment. Out of hundreds of wartime uses, new post war applications for Duck will develop. Because we supply so much of our Duck to the armed forces, eight of the Army-Navy "E" awards made to the mills we represent were for "Excellence" in the production of Duck.

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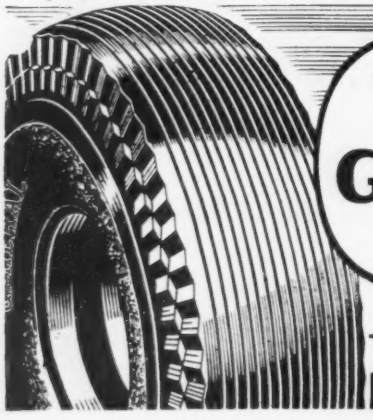

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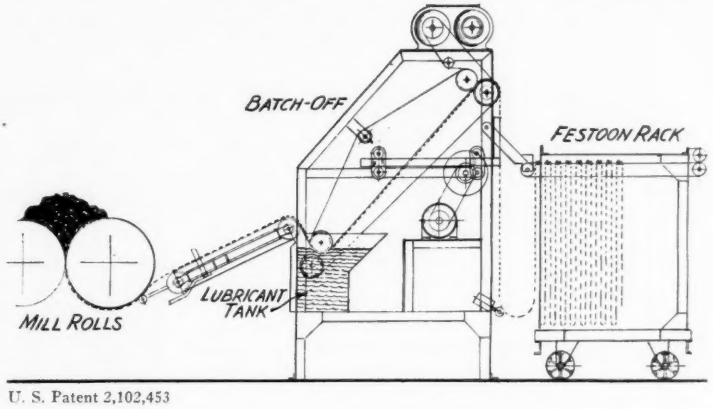
A Big Time and Labor Saver for the Rubber Industry



U. S. Patent 2,102,453

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At last you are able to reduce that Banbury cycle.

One more of your synthetic rubber problems solved.

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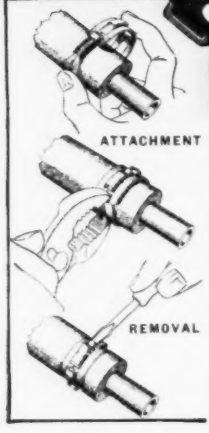

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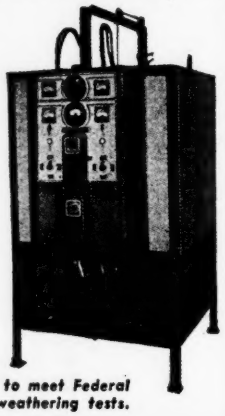
The Twin-Arc Weather-Ometer has full automatic control of light and water periods. The Atlas Cycle Timer unit can be set to reproduce any combination of weathering conditions. A direct reading thermal regulator, automatic shut-off switch and a running time meter is included on the control panel. After setting exposure cycle on the control panel the Weather-Ometer is safe to be left in continuous operation over night without attention except to replace carbons once in 24 hours.



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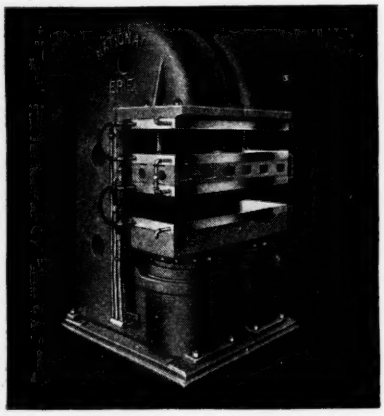

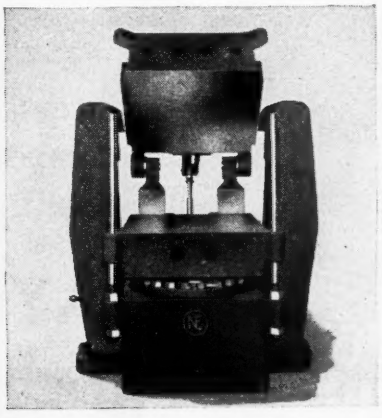

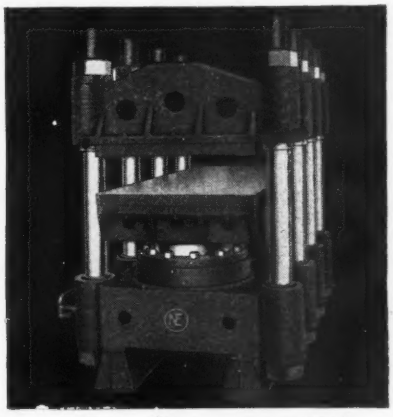

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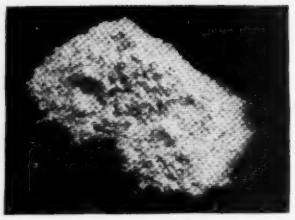

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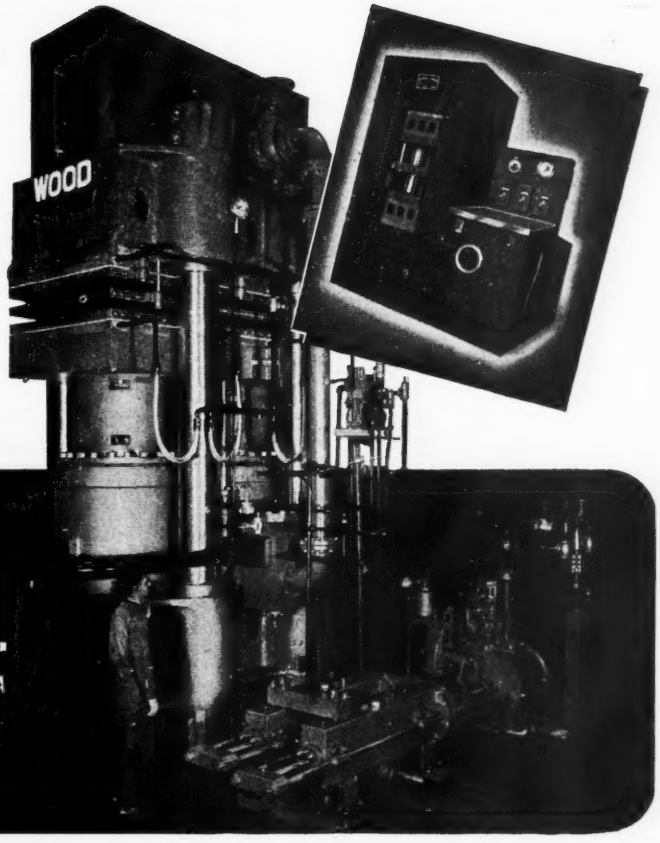

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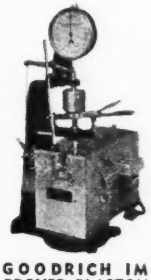

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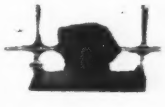

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CHEMICAL ENGINEER—COLLEGE GRADUATE PREFERRED—for position in Compounding Section of progressive manufacturer, producing tires and tubes. Previous experience desirable, but not required. Plant located in Mid-Atlantic area. Complete history of qualifications should be included in letter of application. Address Box No. 977, care of INDIA RUBBER WORLD.

THOROUGHLY CAPABLE MAN EXPERIENCED in modern methods of operating Tubing Machine Department, Mechanical Rubber Goods plant. Reply in detail giving names of companies where experience obtained, length of service, age, salary, etc. Address Box 978, care of INDIA RUBBER WORLD.

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CHEMIST FAMILIAR WITH ALL TYPES OF SHOE ADHESIVES to take charge of plant in vicinity of Boston. Write particulars and salary expected. Address Box No. 996, care of INDIA RUBBER WORLD.

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AN INCORPORATED MECHANICAL RUBBER sales company offers a good opportunity for a man with entrée, or acquaintance with consumers. A stock interest available in company, but not necessary. Address Box No. 992, care of INDIA RUBBER WORLD.

CHEMIST FOR LABORATORY AND FACTORY DEVELOPMENT work on soles, heels and mechanicals. Some plastic experience desirable, but not necessary. New England location. Address Box No. 997, care of INDIA RUBBER WORLD.

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TIRE AND TUBE DEVELOPMENT AND CONstruction engineers, excellent opportunity in a medium-sized organization. Salary commensurate with ability. Plant located in Pennsylvania. Address Box No. 999, care of INDIA RUBBER WORLD.

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Suburban Boston Area. Permanent postwar position. Must be able to furnish Certificate of Availability.

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(Classified Advertisements Continued on Page 372)

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Two Sizes
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HYDRAULIC VALVE

THE HIGHER THE PRESSURE THE TIGHTER THE VALVE

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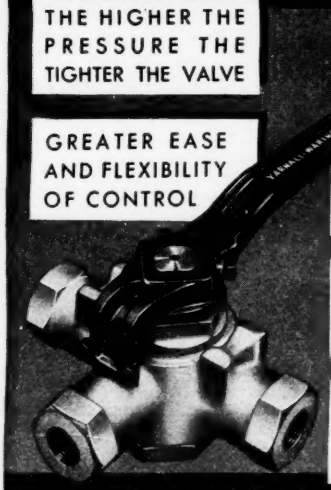

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CHEMIST EXPERIENCED IN ALL PHASES OF COMPOUNDING, processing, and development of tires, tubes, and mechanical goods, desires a position offering future opportunities. Age 26, draft deferred. Address Box No. 995, care of INDIA RUBBER WORLD.

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WANTED: HYDRAULIC PRESSES, 6" to 14" RAM. STATE MAKE and particulars. PLASTIC PRODUCTS, Inc., 415 Lexington Ave., New York, N. Y.

WANTED: HYDRAULIC PRESSES WITH HEATED PLATENS, 150 tons and up, also Banbury Mixer, Vulcanizer at least 5' diameter, and other good equipment wanted for expansion program. Address Box No. 1, care of INDIA RUBBER WORLD.

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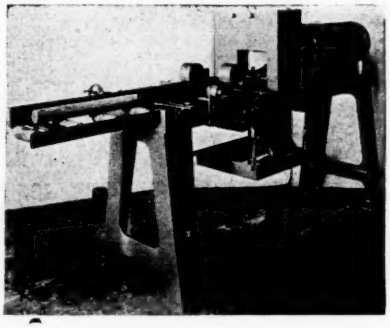

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Red Lead (95% · 97% · 98%) **Sublimed Blue Lead**
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Classified Advertisements

Continued

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Saturators

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OF THE

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ON THE PREMISES

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SALE DATE: THURS., DEC. 14th 1944—AT 1 P.M., E.S.T.

COMPRISING

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1—24" x 24" WILLIAMS & WHITE HYDRAULIC VULCANIZING PRESS, 18" ram, 18" stroke.

1—30" x 60" M & W HYDRAULIC SINGLE OPENING PRESS, 2—25" rams, 250 T. capacity.

2—12" x 12" WATSON STILLMAN HYDRAULIC SINGLE OPENING PRESSES, 8" ram, 75 T. cap.

2—10" x 10" ELMS HYDRAULIC PRESSES, 6" ram.

2—24" x 24" ADAMSON TWO OPENING HYDRAULIC PRESSES, 12" ram, 112 T. capacity.

2—36" x 36" FARREL TWO OPENING HYDRAULIC PRESSES, 12" ram, 141 T.

2—15" x 15" WATSON STILLMAN FOUR OPENING HYDRAULIC PRESSES, 8" ram, 75 T. capacity.

BATTERY OF 4—20" x 20" SINGLE OPENING HYDRAULIC PRESSES, 15" ram, Self-contained Vickers Hydraulic Rotary Pump and Motor.

2—20" x 20" Hand Screw Vulcanizing Presses.

2—19" x 24" x 30" No. 4 ADAMSON REFINER, driven thru a 75 h.p. Falk Reduction Gear Unit, with a 100 h.p. Westinghouse Slip Ring Motor.

Line of Two—16" x 20" x 40" BIRMINGHAM IRON FDY. DOUBLE BULL GEAR REFINERS, driven thru a 250 h.p. Falk Reduction Gear Unit with a 150 h.p. General Electric Slip Ring Motor.

Line of Four—20" x 22" x 50" MILLS, driving thru a 500 h.p. Birmingham Reduction Gear Unit with a 300 h.p. Westinghouse Slip Ring Motor.

Line of Two—20" x 22" x 50" MILLS, driving thru Falk Reduction Gear Unit, with 200 h.p. General Electric Motor.

2—15" x 36" MILLS.

1—12" x 30" THREE ROLL Farrel Calender.

3—THREE ROLL Paint Mills.

100 Gal., 200 Gal., and 300 Gal., CHURNS.

1—100 Gal. Dough Type Cement Mixer.

1—19" x 24" x 32" CRACKER, driving thru a 300 h.p. Birmingham Reduction Gear Unit, with a 150 h.p. Allis Chalmers Slip Ring Motor.

1—J. H. DAY HERCULES MIXER, with a 2 h.p. Westinghouse Motor for Tilting Mixer, and 25 h.p. Westinghouse Variable Speed Driving Motor.

3—5' x 20' HORIZONTAL DEVULCANIZERS for 250 lb. Steam Pressure.

1—FLAT BELT CONVEYOR, with 16" Pulleys, 25' centers, driven by 3 h.p. G.E. Geared Head motor.

1—FLAT BELT CONVEYOR with 18" Dead Pulley and 20" x 23" Magnetic Head Pulley, 50' Centers and a 5 h.p. Westinghouse motor.

1—FLAT BELT CONVEYOR with 16" Pulleys, 40' Centers and 5 h.p. General Electric motor.

1—ROBINSON TWO-SURFACE 32" x 9' GYRATING SCREEN, with 2 h.p. General Electric Motor.

1—VERTICAL CHAIN ELEVATOR with 80' Centers and driven by Geared Head Motor.

1—VERTICAL CHAIN ELEVATOR with 70' Centers and driven by Geared Head Motor.

1—HYDRAULIC PRESS MFG. CO. ACCUMULATOR, 3" ram, 5' stroke.

1—WORTHINGTON TRIPLEX HIGH PRESSURE PUMP, 1¼ x 10, 2000 lb. Pressure, with 30 h.p. Wagner Motor.

1—3" ALLEN TUBING MACHINE.

1—3" HARVEY TUBING MACHINE.

1—8" ALLEN Tuber and Strainer.

IMPORTANT

THE No. 3 BANBURY MIXER, AS WELL AS THE 24" x 24" WMS. & WHITE VULCANIZING HYDRAULIC PRESS (appearing in this ad) ARE LOCATED AT:

The O'Sullivan Rubber Co.
Winchester, Va. (30 mi. from Hagerstown, Md.)

THESE MACHINES MAY BE INSPECTED BY CONTACTING MR. CARPER AT THE O'SULLIVAN PLT. The above mentioned 4 units will be sold from the premises of the VICTOR PRODUCTS CORPORATION, where this AUCTION SALE IS TAKING PLACE—but it is important that you inspect these machines PRIOR to the Sale, to facilitate your bidding.

1—6" ADAMSON Tubing Machine.

1—8" HOUSATONIC Strainer.

1—15" x 24" BIRMINGHAM Washer.

6—TRIPLEX HIGH PRESSURE AND LOW PRESSURE PUMPS.

3—CENTRIFUGAL PUMPS.

1—TIRE CUTTER, with 16" Blade and 3 h.p. General Electric Motor.

1—Twin Carcass Trimming Machine, with ½ h.p. B-Line Motor.

1—TWIN CARCASS TRIMMING MACHINE, with 2 h.p. Western Motor.

1—SPRINGFIELD KNIFE GRINDER, belted to a 5 h.p. General Electric Motor.

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600 lb. cap. Chatillon Tensile Strength Tester.

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Rubber Flexing Machine with ¼ h.p. G. E. Motor.

MINCO Abrasion Machine, with ¼ h.p. motor W-P Laboratory Mixer.

12 x 36 Laboratory Devulcanizer.

6" x 12" Stewart Bolling Laboratory Mill, with 5 h.p. G. E. Motor.

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6—Cracker Rolls, with Spiral Corrugations.

4—NEW Mill Rolls.

1—Used Mill Roll.

3—Refinery Rolls.

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6½" Overhang Excelsior Drill Press, with 1 h.p. B-Line Motor.

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No. 3 J. N. LaPointe Mechanical Broach.
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75 h.p. Allis Chalmers Slip Ring Motor.

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with the hope of Victory
in the New Year

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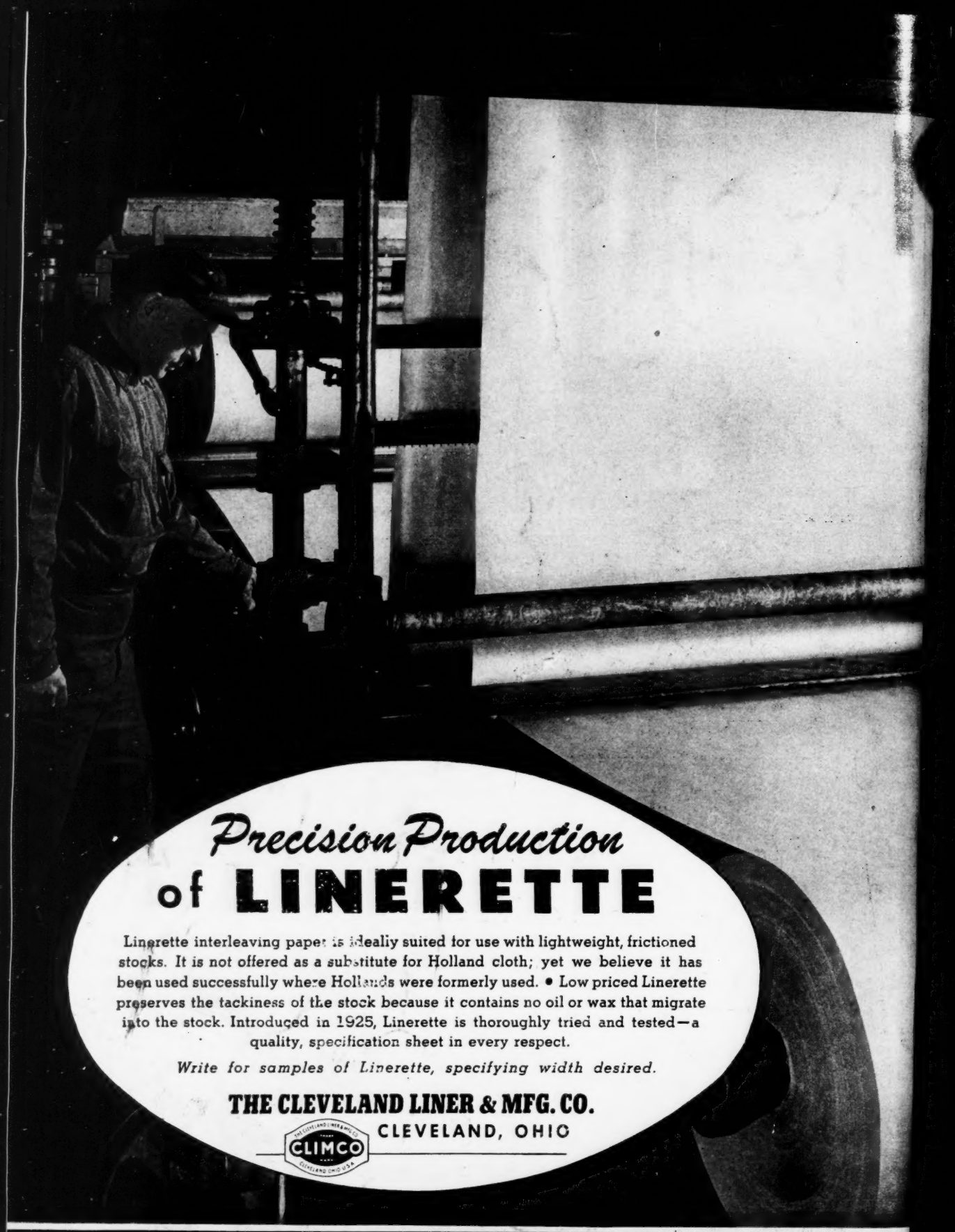

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CLIMCO

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